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Differentiation by Tuberculin Testing of Infection in Cattle due to the Human, Bovine and Avian Types of Tubercle Bacilli*

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INTRODUCTION

When bovine tuberculosis was declared a notifiable disease by the Animal Disease Law of 1899 in Finland, the Bang control system was put into operation. The country's herds of cattle were submitted to the subcutaneous tuberculin-test and nearly 10 per cent. of the cattle reacted. In most cases the reactors were slaughtered and as a result their number decreased year by year. In 1910, the intradermal tuberculin test was brought into use in Finland, the number of reactors at this time being 4·4 per cent. The more reactors that were slaughtered, the fewer became the positive cases as seen at *post-mortem* examinations. Twenty years intensive control work by Bang's method elapsed and thousands of cattle had been slaughtered; at the same time the usual preventive measures had been used in the byres and in connection with milk distribution. Even so, the percentage of reactors never fell below about 4. On the other hand, cases of tuberculosis found at meat inspection became very rare and in 1927, for instance, only 0·1 per cent. of cattle so examined were found to be tuber culous. In other words, an inexplicable dispro portion appeared in the relation between the results of tuberculin tests and the findings of meat inspection. There were farms where hundreds of reactors had been slaughtered over a period of years and on which it was found that very few showed lesions when examined *post-mortem*. This phenomenon finally became so general that the value of the tuberculin test appeared to be questionable. An official enquiry was ordered.

INVESTIGATION MADE

When I began investigations in 1928, I chose as an experimental farm, one where numerous reactions had occurred in the herd over many years, but in which tuberculous lesions had never been seen on *post-mortem* examination of the reactors. I carried out tuberculin tests on the herd and obtained reactions in three calves of about six months of age. One of them was taken alive to Helsingfors and slaughtered in the presence of several veterinary surgeons. No tuberculosis lesions were to be found. Adopting the usual bacteriological precautions, I collected samples from all the organ lymph nodes, conveyed them to the State Veterinary Laboratory and inoculated a total of 25 guinea-pigs with material from them. No tuberculous lesions could be found in the guinea-pigs on examination during life at the end of two months, but after three months three of them died of tuberculosis—those which had been inoculated with material from the retro-pharyngeal, hepatic and intestinal lymph nodes respectively. New guinea-pigs and rabbits were inoculated from the spleens of the dead guinea-pigs and the results of the inoculation experiments indicated that it was a human type infection. The calf had evidently been infected *per os*, with human type tuberculosis. Enquiries were made at the farm, and it was found that the cowman, who had looked after the calves, had died of open pulmonary tuberculosis two months after I had tested the herd with tuberculin.

PATHOGENICITY FOR CATTLE OF THE HUMAN TYPE OF TUBERCLE BACILLUS

A laboratory experiment by Hindersson followed—in reality, the old experiment of Koch and Schütz—as to whether the human type of bacillus is pathogenic to animals. A seven to eight month-old negatively-reacting calf was fed with sputum from a tuberculous man and was tested with human and bovine tuberculin two months later; the skin thickness increase with the former was 2·8 mm. and with the latter 3·9 mm. The calf was killed two weeks later. Macroscopic lesions were found. Material from the mediastinal, bronchial and portal lymph nodes was inoculated into guinea-pigs and cultures were made on Hohn's Z medium. Growth on

*Translated by J. Edwards, Imperial Bureau of Animal Health.

the latter appeared in two weeks and was typical for the human type bacillus. The guinea-pigs injected with mediastinal lymph node material died of tuberculosis; the others remained well.

Tuberculin Sensitivity Caused in Cattle by the Human Type Bacillus.

Yet a third test was made. At a small farm there were two girls with pulmonary tuberculosis who, on request, were prepared to look after two negatively reacting calves obtained from a tuberculosis-free herd. The calves were isolated from the other cattle and tended by the girls, who were instructed not to contaminate the calves' food with sputum, but that they should otherwise tend them in the usual way. The calves were tested periodically with tuberculin intradermally. At the completion of one month, calf I had a skin measurement increase of 0.8 mm. with bovine tuberculin and 0·9 mm. with human tuberculin. The corresponding measurements of calf II were 1.2 and 0.7 mm. After eight months the corresponding measurements were: calf I 1.5 mm. and 1.3 mm.; calf II 2.1 mm. and 1.8 mm. At this time the experiment had to stop on account of deaths of the girls. It had, however, been shown that non-reacting calves that are looked after by tuberculous persons begin to react after a certain time.

These results gave rise to thorough tests on farms where reactions to the intradermal test had been obtained for years without the finding of tuberculosis. It was important, not only to scrutinise the reaction results, but also to find out whether and when tuberculous personnel had been in contact with the animals, in order to get a comprehensive idea of the position. Nearly 100 such farms were picked out and studies of the tuberculin test records were begun at the Ministry of Agriculture, where they had been stored. In addition, enquiries were made at the farms about sick persons. I was able to demonstrate the following facts:—

When a tuberculous person works for a time in a reaction-free herd, reactions begin to occur in it.

The reactions may occur after a few months or only after years and it is the calves that react most readily. One can often demonstrate that an animal that was infected as a calf, only begins to react as an adult.

The reactions are generally weak and the increase in the skin measurement is usually between 1 and 3 mm., but may be as much as 7 mm., or even 10 mm., in which case the skin is swollen and oedematous; such cases are, however, rare. The reactions are not stable and are inclined to vary from test to test. In these cases the subcutaneous test is relatively rarely positive. The reactions decrease quickly in number and intensity as soon as the infected person is removed. Cattle may, however, react weakly or irregularly for three or four years after the removal of the affected person and then finally cease to react.

Details of the Tuberculin Test Used in Finland

A suitable place on the shoulder or behind it should be chosen for the point of injection, where the hide can easily be folded evenly. The place is marked by removing the hair with a hair clipper (No. 000 or ¼ clipper) from a surface about 2 to 3 cm. × 6 cm. wide. The skin should be measured with a special calliper that indicates the result with a precision of 1/10 mm. The calliper should be pressed against the skin firmly, but not hard, and the measurement taken. Then the place should be washed with tepid soapy water by using a soft cloth and the point of injection disinfected with 50 per cent. spirit. The injection, 0.1 c.c. of intradermal tuberculin, should be performed by means of a 1 c.c. sterilised and tight syringe provided with a regulating screw, the needle-point of which has been slightly heated in a flame before each insertion. The needle employed should be sharp-pointed and should taper evenly (should not be lancet-like), No. 17 or 18 gauge and preferably strengthened at the base. The injection is made into the middle layer of the skin whereupon an elevation the size of a small pea is noticed in the skin. After the injection the site should again be disinfected with 50 per cent. spirit. The tuberculin employed should be taken from a newly opened ampoule, the opening and the filling of the syringe being done over a flame. The next measurement is taken, unless otherwise prescribed in special cases, three days after the injection.

In order to obtain accurate results and to exclude protein reactions, it is necessary to do control broth tests simultaneously; also 35 per cent. tuberculin, not 50 per cent. tuberculin, should be used for reasons into which I cannot go here. No attempt should be made to diagnose the type of infection from a single tuberculin test; that is only possible in exceptional cases.

The skin reaction measurements (S.R.M.) and their nature must be carefully noted. I mean by this, that one must see whether the reactions vary in repeated tests or not; for this purpose the herds are tested at intervals of six to twelve months. Tests at shorter intervals are not practicable as cattle which have acquired a human type infection lose their power to react when repeatedly tested much more quickly than they do to the bovine type infection.

After carrying out repeated tests we try to determine the type of bacillus implicated. We

must first note the S.R.M.s and the number of reacting animals in the herd. If the S.R.M.s have varied between 1 and 4 mm. and only a few of the herd have reacted at each test we then ascertain whether the number and intensity of the reactions have been declining during the whole period of testing, and if so whether the decline has been regular and progressive or whether the reactions have varied from test to test. If we find that the reactions have never been large, that only a part of the herd has reacted, that the S.R.M.s have been decreasing or have disappeared, or that the reactions were variable and that the turning out to pasture (break of contact between cattle and their tuberculous attendants) was followed by a decrease in reactions, then the diagnosis is clear. If doubts still persist, however, the subcutaneous test is applied, and if the reactions are negative or few and weak, the diagnosis is confirmed, *i.e.*, the infection present is of the human type.

This is illustrated by the herd dealt with in the accompanying table (p. 636). I have chosen a herd where the S.R.M.s were quite large. In January, 1924, a large part of the herd on the farm reacted, and so bovine type tuberculosis was suspected. But tuberculosis had never been known on the farm and the owner refused to accept the test results and did not undertake any control measures. In May of the same year there was a modification in the tuberculin used in Finland and the reactions to it were only half as great as before and the number of reactors was less. The subcutaneous test was used on the herd in question, and the results were almost completely negative. For three years nothing more was done to the herd, then in December, 1927, the subcutaneous test was carried out again and only a few weak reactions occurred. In 1929, the adult cattle were negative to the intradermal test and the only reactions were in calves. The number of reactors decreased steadily year by year and in 1932, the herd became negative without anything having been done. It is still healthy. It was later found that in 1918 a tuberculous Swiss person had come to the farm, where he stayed till his death in 1929. Soon after his death the reactions in the cattle began to disappear.

If the herd had been infected with bovine type tuberculosis the history would have been quite different. Almost all of the cattle would have reacted sooner or later and the S.R.M.s would have been much greater—certainly many would have been 10-15-20 mm.—the subcutaneous test would have yielded reactions and the reactions would have been stable at successive tests. A certain amount of variation always occurs, but the reactions would have remained significant over a long period.

Type determination is extremely difficult when there is mixed infection such as when infection with the human type is contracted by cattle already affected with the bovine type or *vice versa*. Type determination can be worked out in every case, but great experience of the herd over a long period is necessary. Type determination technique cannot be worked out solely from the figures of tuberculin test records because too many factors exist. We have, however, progressed so far that we can require our district veterinary surgeons who carry out the tuberculosis control work, to declare from the results of the tuberculin tests, whether the infection is of the human or bovine type. By means of tuberculin tests on herds of cattle the veterinarians in Finland have demonstrated the presence of tuberculous persons in hundreds of cases, and whenever the veterinarian finds cases of human type infection in cattle, the medical authority is informed and the personnel is examined.

Absence of Gross Lesions in Cattle Infected with the Human Type Bacillus

Whenever macroscopic tuberculous lesions are found in slaughtered cattle it may be considered unlikely that the human type infection is concerned. Human type infection never causes typical tuberculous lesions in cattle under natural conditions. It causes reactions in cattle but the animals never become clinically tuberculous. (This does not hold good for laboratory experiments.) When no lesions are found in cattle at *post-mortem* examination, it may be a case of bovine type infection in its incubation period, or human type infection.

Other kinds of non-specific reaction also occur; these are usually due to protein sensitisation, and they can be demonstrated as such by means of control broth tests.

Avian Type Bacillus Infection in Cattle

I will outline the position briefly, because a full account of recent research on the subject was published last year by Plum (1937), "Studies on Tuberculosis and Tuberculin Reactions in Cattle."—*Skand. Vet. Tidskr.* **27**. 589-685.

Cattle infected with the avian type bacillus may react to mammalian tuberculin, but when bovine and avian tuberculins are simultaneously injected intradermally in opposite sides of the neck, the reaction to the latter is usually more distinct. In doubtful cases, however, in which the respective S.R.M.s do not differ much at this test, it is advisable to repeat it once or twice, using progressively smaller doses of the respective tuberculins. It is then found that reactions to bovine tuberculin fade out while those to avian tuberculin still occur.

Another diagnostic point of value is that only about one-third of all cattle with avian type infection, which react to the intradermal test

The Course of Tuberculin Test Reactions in a Herd of Cattle Infected with the Human Type of Tubercle Bacillus

The Positive Results are shown in Heavy Type

Name of Animal.	1924 Intradermal Tests (S.R.M.s in 0·1 mm.).						1924 Subcutaneous Test Reactions (Figures in ° C.)	1927 Subcutaneous Test Reactions (Figures in ° C.)	1928	1929 Intradermal Tests. (S.R.M.s in tenths of a mm.).		1930 Intradermal Tests. (S.R.M.s in tenths of a mm.).		1931 Intradermal Tests. (S.R.M.s in tenths of a mm.).	1932 Intradermal Tests. (S.R.M.s in tenths of a mm.).
	9/1	11/1	13/1	23/5	25/5	27/5	22—23/10	12—13/12	17—20/4	3—6/6	7—10/10	23—15/4	26—29/10	1—4/6	24—27/5
Armida IV	**21**	**22**	**22**	**22**	**32**	**17**	39·5 38·7 39·0 38·7 38·7	38·5 38·3 38·2 38·8		4	3	—	3	3	3
Pulla ...	12	8	10				39·1 38·7 38·2 38·2 38·4	38·1 38·0 38·0 38·1 38·7		—		—	—	4	
Renata ...	9	4	**14**	16	12	11	39·0 38·8 37·7 37·9 38·0	38·4 38·6 38·5 38·3 38·9		—					
Nadine ...	**14**	**11**	**11**	1	1	—	39·1 38·6 38·9 38·8 38·9								
Azalea ...	**15**	**12**	**13**				38·7 38·9 38·2 38·1 38·2								
Rotilia ...	**42**	**49**	**40**	**24**	**32**	**32**	39·3 38·9 38·0 38·4 38·6	38·2 37·8 38·2 37·9 38·7							
Rolla ...	**33**	**31**	**20**	5	15	5	38·8 38·8 37·7 37·9 38·3								
Toka ...	10	4	3	**16**	**28**	**22**									
Bebi ...	**20**	**15**	**15**	14	6	3		38·9 38·3 38·4 38·6 38·6		—	2	4	4	—	—
Beata ...	**41**	**27**	**28**	**29**	**33**	**20**	39·0 38·6 38·4 38·0 38·5	38·8 38·6 38·4 38·6 38·8		1	—	—	3	—	
Birgitta ...	**33**	**16**	**14**	1	11	7		38·0 38·0 39·0 38·7 38·2 38·7	2	—	1	—	1	—	1
Baba ...	**24**	**54**	**37**	**14**	6	3									
Sadda ...	7	7	7				39·0 39·3 39·1 38·7 39·2	**39·3 39·2 40·0 40·2 39·8**		1	—	—	9		
Salborg ...	13	8	10				38·9 39·1 38·3 38·7 38·2	**38·5 38·9 39·6 38·7 38·8 38·7 38·5**	3	—	3	6	2	1	
Rhea ...	**12**	**12**	9	10	7	7	38·8 38·9 38·3 38·0 38·2	37·9 38·0 37·8 37·9 39·1 38·3 38·0	1	—	1	3	4	—	
Nattviol ...	**18**	**11**	5				39·1 38·9 37·7 38·0 38·3								
Pencée ...	**16**	1	5				38·5 39·0 37·9 38·1 38·4	39·0 38·7 39·1 39·3 39·1							
Sandra ...	**12**	**12**	**15**				38·5 38·7 38·8 38·2 38·6								
Valma ...	**14**	**18**	**27**				38·5 38·9 38·2 38·2 38·8								
Arabella ...	**17**	**11**	10				38·7 39·2 38·4 38·2 38·5	38·7 38·4 38·2 38·7 39·0		2	—	3	3	1	4
Valhalla ...	**79**	**105**	**87**	**42**	**59**	**46**	39·0 39·0 38·3 38·3 38·7								
Sienna ...	**20**	**17**	**18**	**29**	**42**	**41**	38·8 38·6 38·6 38·5 39·1								
Avance ...	**26**	**30**	**37**	4	**17**	**14**	39·2 39·3 38·7 38·7 39·0	38·2 38·1 38·0 38·0 39·0		2	2	—			
Verona ...	**37**	**36**	**32**	**28**	**22**	**20**	38·5 39·0 38·2 38·1 38·4								
Tilly ...	**34**	**33**	**29**	**43**	**35**	**21**	39·4 39·0 38·8 39·0 39·1								
Signora ...	**15**	2	5	4	1	1	**39·1 39·0 39·7 38·1 38·6**								
Odda ...	**21**	9	**22**	**18**	**18**	8	38·4 39·0 38·3 38·3 38·8								
Sirkka ...	**12**	**12**	**26**				39·0 38·9 38·2 38·3 38·4	38·2 38·4 38·1 38·3 38·8		—	1	5	4	6	
Tulpan ...	**28**	**24**	**22**	**20**	7	7	38·3 39·0 38·6 38·7 38·6	38·5 37·8 37·8 38·0 38·9		1	3	—	—	2	1
Mamsell ...	**35**	**34**	**23**	**57**	**61**	**45**	38·9 38·9 38·5 38·6 38·6								
Valkyria ...	**53**	**85**	**71**	**40**	**50**	**37**	40·0 39·2 39·5 39·3 39·3								
Sanni ...	**23**	**16**	**14**	11	7	1	38·6 38·7 38·0 38·1 38·4	38·3 38·4 38·0 38·2 38·8		6	4	—	3		
Laura ...	**17**	**12**	**20**	**26**	**32**	**19**	39·1 39·0 38·3 38·5 38·6	38·4 38·3 38·2 38·4 39·0		—	—	3	—	3	
Saga ...	**38**	**41**	**39**	**14**	**25**	10	38·5 38·7 38·4 38·5 38·5	38·1 38·1 38·0 38·0 38·5		10					
Svala ...	**71**	**50**	**52**	**13**	**17**	5	38·7 39·0 38·3 38·4 38·8								
Lora II ...	**18**	**34**	**28**	11	10	1	38·6 38·6 38·0 38·2 38·3	38·4 38·9 38·1 38·4 38·7							
Valeria ...	**24**	**15**	**38**	14	14	12	38·5 38·2 38·2 38·2 38·5	38·5 38·9 38·8 39·0 39·3							
Anna ...	**20**	**15**	15	20	14	11	39·0 39·0 38·8 38·7 38·6	38·5 38·6 38·2 38·5 38·8		1	4	5	—	—	—
Rikissa ...	**12**	10	10				38·8 39·0 38·2 38·5 38·8								
Sola ...	5	7	2				38·9 38·9 38·0 38·2 38·6	38·2 38·9 39·7 38·2 38·7 38·4			4	4	1	1	
Syster ...	**20**	9	7	21	6	—	38·5 39·0 38·8 39·2 39·0								
Elizabeth ...							39·2 38·7 38·7 38·5 38·4	**39·1 39·4 39·0 39·2 40·0 39·4 38·8**		—	—	—	8	10	9
Deli ...							38·7 38·6 38·3 38·3 38·7	38·3 38·4 37·9 38·9		6	1	—	10	**13**	
Glada ...								38·4 38·2 38·2 38·2 38·6		**12**	**33**				
Gusti ...								38·3 37·7 38·0 38·2 38·9		**35**	9				
Gurli ...								38·2 39·0 38·5 38·1 38·4 38·0 38·6	4	**30**					
Erica ...								**38·6 39·0 39·2 38·7 39·5 38·7 38·4**	5	—	**19**	4	5	3	2
Edla ...								38·6 38·8 39·0 38·4 38·7 38·9 38·7		—	—	1	**21**		
Hera ...										**29**					
Gudiva ...										**25**	**34**				
Galanta ...										—	5	**20**	**12**	10	
Giva ...										**20**	5	**12**	1	1	2 2
Glady ...										**6**	**13**	6	9	2	2 2
Gunilla ...										**18**	**34**				
Hagar ...										—	21				

with avian tuberculin, react when submitted to the subcutaneous test with bovine tuberculin.

[Note by Translator: According to the government veterinary reports issued in Finland, the incidence of bovine tuberculosis is very low there. The disease has been notifiable for 39 years and tuberculin testing has been in use for this period. As it was found that the initial incidence was only about 10 per cent., a concerted effort was made to eradicate it quickly and very strict interpretation of the tuberculin test was adopted; thus with the single intradermal method an increase of 4 mm. or over was regarded as a strong positive reaction and one of 1 to 4 mm. as a weakly positive reaction. As an aid to correct interpretation control injections of broth are used to a large extent. When tuberculin and control broth are used in conjunction, a difference of 1 mm. between the resultant skin swellings is regarded as a weak, positive reaction.

This strict interpretation of the tuberculin test by Finnish veterinarians will doubtless be criticised by English workers, as in the case of the calves referred to above.]

DISPOSAL OF ARMY HORSES

"All who are sympathetically interested in the fate of horses sold out of the Army and hold that everything possible should be done to ensure their welfare will be glad to learn," says *The Times*, "that the arrangements now in force for their disposal have been drawn up with this end in view.

"There are five methods of disposal:—

Only those animals that cannot be placed to advantage elsewhere in the Service will be put on the market, and then only if passed by a veterinary officer as fit for sale by public auction.

A sufficiently high reserve has been fixed on old Army horses sold at auctions to make it unprofitable for them to be bought solely for export.

An animal failing to reach the reserve price may be sold for not less than £10 to a good home on condition that the prospective purchaser is vouched for by a responsible serving officer.

The only cases in which such an animal unfit for sale by public auction may be disposed of alive are: (*a*) To serving officers wishing to buy them on sentimental grounds with the guarantee that they will never be resold; and (*b*) to selected custodians who are willing to give not less than £10 for a mare considered fit for breeding.

Any animal not disposed of under any of the foregoing conditions is painlessly destroyed under military supervision."

* * * * *

We regret to record the death, which recently took place at the age of 70 years, of Professor E. Mesnil, of the Pasteur Institute of Paris, member of the Section of Anatomy and Zoology of the Paris Academy of Sciences. Professor Mesnil was well known to all workers in tropical veterinary pathology.

Laboratory and Clinical Investigations on Tuberculin Purified Protein Derivative (P.P.D.) and Old Tuberculin (O.T.)*

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The value of the Mantoux test as a clinical aid seems to be doubted in some quarters, apparently on the assumption that there is almost complete tuberculinisation of the population. This may still be true of crowded urban districts, but recent epidemiological surveys have shown that in many communities a large percentage of people reach adolescence without having been infected, and, moreover, that this percentage is becoming greater as the incidence of tuberculous disease is decreasing. There can be little doubt, therefore, that with time the Mantoux test will be found more and more useful in clinical work.

Since the Mantoux test is a quantitative one, the material used in its performance should be stable, and constant in composition and potency; further, the exact amount of the active principle injected should be known. Only if these conditions are fulfilled will it be possible to compare repeated tests at intervals on the same patient, and to correlate or pool the observations of different workers investigating large groups.

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Until a few years ago Koch's old tuberculin was always used; but it was increasingly realised that this crude material did not fulfil the conditions laid down above.

Old tuberculin is usually prepared by the growth of the tubercle bacillus on a veal-infusion-peptone medium containing a comparatively large amount of glycerol. The mature culture is steamed and the filtrate evaporated to one-tenth of its original volume. Thus it is a complex mixture, containing, besides the active principle, much non-specific material, such as peptones, salts, glycerol, and bacillary metabolic products. Long (1934) has stated that its potency is due to about 1 per cent. of its total substance. It has been found that batches of old tuberculin prepared not only from different strains, but even from the same strain and in the same type of culture medium, may vary in potency. Moreover, no accurate method of standardisation has been developed. The "shock method," which was found to carry a large error, was replaced by intracutaneous testing in guinea-pigs, but even this may allow a 40 per cent. error unless a large number of comparisons are made (Okell and Parish, 1927). Finally, the use of old tuberculin has the disadvantage that dilutions deteriorate comparatively rapidly.

These considerations have stimulated much research work, particularly in America, to eliminate non-specific factors and thus prepare a purer product. The first important step was made when Long and Seibert (1926) showed that the tubercle bacillus would grow and produce a potent tuberculin on a synthetic medium with asparagine and ammonium salts as the sole sources of nitrogen. It was found that protein-like substances were formed during growth on this medium, and this led to the view that the active principle was of a protein nature, as suggested much earlier by Koch. Definite confirmation was obtained by Seibert (1928), who prepared unheated culture filtrates of the organism grown on Long's medium, and was able to isolate a crystalline protein which is water-soluble and a very active tuberculin. Repeated recrystallisation of this product increased rather than decreased its potency, demonstrating conclusively the protein nature of the active principle. This method is impracticable for the routine production of a pure tuberculin for the following reasons: (1) the amount of tuberculo-protein which will crystallise is very small; (2) the protein which will not crystallise is also physiologically active; (3) when the product is injected there is some risk of producing sensitisation which might lead to errors in reading. In this connection Seibert (1933) has shown that it is possible to isolate the active principle in different states of molecular aggregation according to the method of preparation. Potent tuberculin preparations, all of a protein nature, have been made with different molecular weights = namely: (*a*) ammonium sulphate fraction from unheated culture filtrates (Seibert's TPA)—molecular weight = 25,000; (*b*) trichloracetic acid precipitate from unheated culture filtrates (Seibert's TPT)—molecular weight = 3,000 to 8,000; and (*c*) trichloracetic acid precipitate from steamed and evaporated culture filtrates (Seibert's SOTT —"synthetic medium old tuberculin trichloracetic-acid-precipitated")—molecular weight = 2,000. The sensitising power of these preparations has been investigated; with the exception of SOTT which possesses the lowest molecular weight, they are capable of eliciting reactions of the Arthus type when injected repeatedly into the skin of guinea-pigs and of producing precipitins in rabbits. Obviously it is undesirable to use preparations with which there is the slightest risk of sensitisation, for they may lead to erroneous results (Aronson and Nicholas, 1933); the best diagnostic agent so far produced is therefore the non-sensitising SOTT, which Seibert (1934) has more recently named "purified protein derivative." This is simply the substance of the lowest molecular weight which will cause the tuberculin reaction in sensitive subjects. It is isolated as a dry powder, any desired doses of which can be issued to doctors in sterile form in bottles or in the shape of tablets. Solutions are made up very conveniently as required. It is claimed that P.P.D. is always of the same composition and potency. Variation in strain of bacillus or luxuriance of growth merely causes variation in yield of P.P.D. Thus an exact known quantity by weight of the effective substance is always injected. The other advantages claimed are absence of non-specific substances, increased stability, and the convenient preparation of dilutions.

I.—Laboratory Investigations

By F. V. Linggood and H. J. Parish

In this section we propose to deal with the preparation, potency, and stability of purified protein derivative (P.P.D.) and of "dried dilutions" of P.P.D.

Preparation of Purified Protein Derivative

We have adhered closely to Seibert's method (1934). The bacillus is grown on a synthetic protein-free medium, from which an old tuberculin is prepared by steaming and evaporation. The bulk of the impurities is removed by ultrafiltration and the active principle precipitated with trichloracetic acid. The precipitate is thoroughly washed with this reagent, and the acid is then removed with ether, which at the same time dehydrates the protein derivative,

For those who are specially interested in the method of preparation, technical details are as follows :—

A suitable strain of tubercle bacillus is grown as a film in large 20-litre (" rose-water ") bottles on the synthetic medium of Long and Seibert (1926), which in our hands has given a better product than certain other synthetic media. After two to three months the mature cultures are killed by steaming for two hours, and the organisms are then removed by filtration through paper pulp. Glycerol is added in the proportion of 122 c.cm. to each litre of original culture fluid, and the mixture is evaporated on a steam bath to one-fifth to one-tenth of its original volume. This concentrate is diluted with an equal volume of 1 per cent. phenol in distilled water, left in the cold room for some days for any precipitate to collect, and then filtered warm through a Berkefeld candle. By this means a synthetic medium old tuberculin is produced which has now to be freed from all extraneous matter.

A preliminary purification is made by ultrafiltration, using the technique described by Quigley (1934), except that a special collodion is used (I.C.I. HX45 as a 13 per cent. solution in glacial acetic acid).

The synthetic medium old tuberculin prepared as above is diluted with an equal volume of 0·5 per cent. phenol water, and drawn through the ultrafilters. The active principle remains outside the filters, while salts, glycerol, amino-acids, and other non-colloidal constituents of the crude tuberculin pass through the membranes. Washing with 0·5 per cent. phenol water is continued until the ultrafiltrate is practically chloride-free.

The solution outside the membrane, concentrated to a small volume, consists mainly of the active principle bound to polysaccharide. The latter is removed by the addition of one-quarter volume of freshly prepared 50 per cent. trichloracetic acid. The resulting precipitate, which consists almost entirely of the pure protein derivative (Seibert, 1932), is collected by centrifugalisation, and washed six to eight times with fresh 10 per cent. trichloracetic acid to remove the contaminating polysaccharide.

After the final washing the precipitate is smeared rather thickly inside the centrifuge tube, and the excess of water is removed by drying *in vacuo* for half an hour, but complete drying must be avoided. (From this stage onwards great care must be taken to prevent any of the powder being inhaled by the manipulator. All operations are conducted inside a box with a closely fitting glass lid and " sleeves " to protect the arms of the manipulator. Suction from a water-pump is gently applied to one side of the box to prevent any of the powder diffusing around the lid into the air of the room. As a further precaution rubber gloves and a respirator should be worn.) Large volumes of dry ether are used to extract the water and trichloracetic acid from the precipitate by alternate trituration and decantation through a Soxhlet thimble ; the process is repeated until the precipitate is in the form of a very fine powder. By this time it will be found that the ether coming through the Soxhlet thimble gives no acid reaction. The fine powder is transferred to the thimble and is thoroughly washed again with dry ether. The thimble is then placed over paraffin wax in a desiccator, and the last traces of ether removed *in vacuo*. As tuberculin adheres tenaciously to filter-candles and glassware (Parish and O'Brien, 1935), the apparatus in the tuberculin laboratory must on no account be employed for other biological work.

Potency and Stability of Purified Protein Derivative

The dry purified protein derivative is a tan-coloured powder. Although minor variations have been noticed occasionally, the potency of different preparations has been remarkably constant. When redissolved at a concentration of 5 mg. per c.cm., successive batches almost invariably have been equal in potency to the international standard old tuberculin on guinea-pig intracutaneous tests. The solutions for these tests are prepared by the addition of a small amount of N/10 alkali to the powder in order to dissolve it ; borate buffer solution is added subsequently and the *p*H adjusted to 7·4, the final concentration being 5 mg. per c.cm. The dry purified protein derivative is a very stable preparation.

" Dried Dilutions " of Purified Protein Derivative : Preparation, Potency and Stability

In America the active principle is incorporated in tablets with a dry diluent, beta-lactose (Reichel and Clark, 1934), and issued in two strengths. We have adopted a somewhat different procedure. The dry powder is weighed and dissolved as described above to give a final strength of 5 mg. per c.cm. The potency of the material, after filtration through a Berkefeld candle, is checked on tuberculous guinea-pigs on a number of occasions to ensure that it is equivalent to international standard old tuberculin. The standardised solution of P.P.D. is then diluted under sterile conditions in a special boric-acid-borate buffer solution of *p*H 7, the final dilutions being distributed in bottles which contain 1 c.cm. (ten doses of 0·1 c.cm.) of strengths equivalent to 1 in 10,000, 1 in 1,000, and 1 in 100 of international standard old tuberculin. These dilutions are evaporated to dryness *in vacuo* under sterile conditions. Immediately before use 1 c.cm. of a special borate diluent is added to the required bottle, which is left stoppered for two minutes for the " dried dilution " to dissolve, and is then well shaken. The strength of the boric acid, borate, and salt in the final diluent is adjusted so that the final mixture is isotonic and of *p*H 7·5. The dose of the reconstructed " dried dilution " is 0·1 c.cm. The actual weights of P.P.D. prepared for injection are 0·00005 mg. (that is, 0·1 c.cm. of dilution 1 in 10,000), 0·0005 mg., and 0·005 mg.

Before issue from the laboratories the potency of each batch of " dried dilutions " is tested on tuberculous guinea-pigs against freshly prepared dilutions of international standard old tuberculin. For these tests the " dried dilutions " are redissolved in the special diluent, and may then be diluted further in physiological saline to provide a suitable range of dilutions for the injections. Thus a dilution of 1 in 500 is generally prepared from the 1 in 100 " dried dilution," and dilutions of 1 in 2,000 and 1 in 4,000 from the 1 in 1,000 " dried dilution." Checking the potency of the 1 in 10,000 " dried dilution " is only practicable on very sensitive guinea-pigs. So far we have been unable to detect any loss in potency during preparation or

after storage for three years at room temperature. After re-solution, however, deterioration is more rapid than that of corresponding dilutions of old tuberculin.

With reference to the particular "dried dilutions" of P.P.D. which were used in the following clinical study, our aim was to make them as nearly equal to the corresponding dilutions of old tuberculin as possible. Actually they proved to be very slightly stronger, although this difference was apparent only after repeated tests on the skin of very sensitive guinea-pigs. Altogether 46 guinea pigs have now been used, with the following results :—

P.P.D. = O.T. on 12 guinea-pigs.
" > " " 22 "
" < " " 12 "

We would emphasise that the difference between the dilutions of the two preparations was not detectable on all the guinea-pigs, and that only our most sensitive animals indicated that the dilutions of P.P.D. were a trifle stronger. Twofold differences were clearly distinguishable on the whole of the guinea-pigs, and it was agreed by all who observed the reactions that the difference in potency indicated in the above table was very much less than twofold.

II.—Clinical Investigations

(*a*) Mantoux Tests : A Comparison of Purified Protein Derivative with Old Tuberculin

The present investigations were undertaken to compare P.P.D. with old tuberculin in clinical work. At first sight this is absurd, since we are apparently comparing two substances made comparable by standardisation. But since the standardisation is carried out in guinea-pigs, such an investigation is still indicated in man, and might serve to emphasise any deficiencies of the guinea-pig standardisation. Preliminary tests on human subjects made previously by Davis and Guzdar (1935) and Westwater (unpublished) have shown that "wet" dilutions of P.P.D. deteriorated more rapidly than corresponding dilutions of old tuberculin and were thus unsuitable for use. Therefore, as mentioned earlier in this paper, "dried dilutions" of P.P.D. and also a suitable borate buffer diluent were supplied to us from the Wellcome Laboratories. Corresponding dilutions of old tuberculin in 0·5 per cent. phenol saline were also provided, and, on account of the possibility of deterioration, were used within a fortnight (very occasionally three weeks) of receipt.

Particular care was taken in performing the tests and in recording the results. The usual technique was followed—that of injecting 0·1 c.cm. intradermally, choosing comparable sites on each forearm ; and, in view of the extreme "tenacity" of tuberculin to glass (Parish and O'Brien, 1935), separate syringes were reserved, and employed, for each type of tuberculin and for each individual dilution. Some of us found that for accurate work it was helpful to have only one dose in the syringe at a time—that is, the tuberculin drawn up to the 0·1 c.cm. mark—so that attention could be concentrated on raising a proper intradermal "wheal."

The reaction to the intradermal injection of 0·1 c.cm. of tuberculin in a sensitised person is an erythema, an erythematous infiltration, or an actual oedema of the skin, usually at a maximum after 48 hours and varying in size. Mild reactions may present difficulty in interpretation, and there is no universal agreement on what constitutes the minimum reaction to be accepted as positive. Different authorities have taken as suitable criteria areas of erythema varying in diameter from 2 mm. to 10 mm., with or without associated infiltration. In addition there is considerable difference of opinion concerning the best time to read results, but most workers agree that a 24-hour reading is not reliable. Hart (1932) accepts as a positive reaction an erythema or erythematous infiltration whose greatest diameter is 5 mm. or more, taking the 48-hour reading ; and Aronson (1934) has a similar standard. Holm (quoted by Kayne, 1936) requires at least an infiltration of 7 mm. diameter at 48 hours, or 5 mm. at 72 hours, for a positive reaction. Kayne (1936) adopts the following criteria in considering a reaction positive :—

> At 48 hours : area of erythema, with or without swelling, 10 mm. in diameter (mean).
>
> At 72 hours : area of erythema *and* swelling, 7 mm. in diameter (mean).

Tests by G. Gregory Kayne

The erythema and swelling cannot always be measured with accuracy, and the "experimental error" of the size of the reaction has not been determined. It appeared, therefore, that as the object of the present investigation was to assist in clinical work, the comparisons should be based on the relative number of positive and negative reactions. The criteria adopted in considering a reaction positive with either substance are given above.

A total number of 119 persons were tested with old tuberculin and P.P.D. at comparable sites on each forearm : 114 were adult patients at the Clare Hall Sanatorium, Middlesex, all of whom except three suffered, or had recently suffered, from active pulmonary tuberculosis ; the remaining five belonged to the domestic staff, and were healthy (three of them proved negative to all dilutions of both substances). All the results were read after 24, 48, and 72 hours, and the reactions were carefully measured. The subjects were injected first with the highest

dilutions—namely, 1 in 10,000 of each preparation. If the tests were negative or doubtful they were repeated with the next stronger dilution. The results are as follows :—

Table I

Summary of Tests with Purified Protein Derivative and Old Tuberculin

	Dilutions		
	1 in 10,000	1 in 1,000*	1 in 100
P.P.D.— O.T.—	26 patients	7 patients	4 patients†
P.P.D.+ O.T.+	63 ,,	24 ,,	2 ,,
P.P.D.+ O.T.—	29 ,,	1 ,,	0 ,,
P.P.D.— O.T.+	1 ,,	0 ,,	0 ,,

*Some of the tests with 1 in 10,000 that were only just positive were repeated with 1 in 1,000.

† Three of these persons belonged to the domestic staff; the fourth was a tuberculous patient who died two days later.

Table II

Variations of Readings (48 and 72 Hours)

Negative at 48 hours, positive at 72 hours	P.P.D. ...	3 patients
	O.T. ...	7 ,,
Positive at 48 hours, negative at 72 hours	P.P.D. ...	3 ,,
	O.T. ...	4 ,,

Note.—In each of these four groups were tests with both the 1 in 10,000 and the 1 in 1,000 dilutions.

An appreciably greater percentage of positive reactions is obtained with P.P.D. than with old tuberculin (Table I). A few reactions did not appear till 72 hours after the injections (Table II); and, with both old tuberculin and P.P.D., reactions occasionally occurred at 24 and 48 hours, which disappeared 24 hours later.

Tests by A. T. Doig, G. Gemmill, and J. S. Westwater

In the present investigation we adopted the following minimum standard to be accepted as a positive reaction: an erythema of at least 10 mm. or an infiltration of at least 5 mm., in either case persisting for 48 hours. Reactions less than that were considered negative. We consider it would not be safe to accept a simple erythema under 10 mm. as a positive reaction without confirming the result by using a stronger dilution. It should be noted that it is rare to have a 5 mm. infiltration without some surrounding erythema.

By taking the 48-hour reading, any transient erythema arising from "needle trauma" is excluded, as this does not last longer than 24 hours. In this section of the work the 48-hour reading, being usually the maximum, was taken as the standard for comparison of the two tuberculins, and the mean diameter was recorded in millimetres. In order to allow for errors of technique it was decided to regard as equal those reactions in which the mean diameter of the larger did not exceed that of the smaller by more than 25 per cent.*

A total of 302 subjects have been tested, the majority in the course of routine diagnostic work on children and adults. Of these, 241 can be considered adequately tested—that is, negative reactions were checked up to the 1 in 100 dilution—and 228 reacted to either or both forms of tuberculin.

In Table III the results are compared by measurement of the mean diameter. In 60·1 per cent. the reactions were equal; in 27·2 per cent. the reaction with P.P.D. was the greater; while in 12·7 per cent. it was smaller than the response to old tuberculin. This would suggest that the dilutions of P.P.D. were slightly more potent, as they appeared to be in tests on guinea-pigs. The possibility of the greater

*Twenty-three subjects were injected by one of us (G. G.) in both arms at comparable sites with the *same* material taken from the *same* batch—namely, 0·1 c.cm. of P.P.D. diluted 1 in 1,000, or, for some tests, 1 in 10,000. The difference in the mean diameter of the individual reactions on both arms was usually 3 mm. or less, the extreme difference being 6 mm. in one comparison. The means of the mean diameters of all the reactions on right and left arms respectively were almost identical—namely, 22·4 and 22·6 mm. These results suggest that the margin of error—namely, 25 per cent. difference—was adequate, which was taken into consideration for the comparison of P.P.D. and old tuberculin.

Table III

Comparison of Purified Protein Derivative and Old Tuberculin by Measurement of the Mean Diameter of Reactions

Comparison of Mean Diameter	Dilution									Total	Per cent.
	1/10,000			1/1,000			1/100				
	A.T.D.	G.G.	J.S.W.	A.T.D.	G.G.	J.S.W.	A.T.D.	G.G.	J.S.W.		
P.P.D. = O.T.	44	23	19	14	20	8	7	2	–	137	60·1
*P.P.D. > O.T.	25	15	3	10	6	–	2	1	–	62	27·2
†P.P.D. < O.T.	11	4	4	5	2	2	1	–	–	29	12·7
									Total ...	228	100

* Includes 24 cases in which reaction to P.P.D. was positive and to O.T. negative.

† Includes 5 cases in which reaction to P.P.D. was negative and to O.T. positive.

stability of P.P.D. being a factor in eliciting a stronger reaction must be borne in mind, although the care taken to use the dilution of the old tuberculin within three weeks of preparation was considered to eliminate this factor,

Table IV

Comparison of Purified Protein Derivative and Old Tuberculin by Incidence of Positive and Negative Reactions

Reactions	A.T.D.	G.G.	J.S.W.	Total	Per Cent.
P.P.D.+ O.T.+	97	64	35	196	86·0
P.P.D.+ O.T.—	19	7	—	26	11·4
P.P.D.— O.T.+	3	2	1	6	2·6
		Total ...		228	100

and Kayne's and Doig's observations (given below) confirm this view. In Table IV, comparing the tuberculins simply by the incidence of negative and positive reactions, the indication of greater potency of the dilutions of P.P.D. is repeated.

It is important to note that, despite the allowance of 25 per cent. in measuring the reactions to cover experimental error, there is considerable divergence in the results, showing that if the Mantoux technique is to be used as a means of standardisation it is necessary that tests be made on considerable numbers of patients before any reasonable assessment of potency can be made. Madsen and Holm (1935) consider the intracutaneous test in humans a method of standardisation preferable to tests in the sensitised guinea-pig. The necessity for a large series, however, has to be met. Multiple tests on the one subject have obvious objections, although Philip *et al.* (1930) considered it a practical method, using serial dilutions with the cutaneous (Pirquet) technique.

The reactions obtained from P.P.D. are similar in character to the response to old tuberculin. They could not be said to be more clear-cut and easier to interpret.

(*b*) Mantoux Tests: Additional Investigations: The Stability of Old Tuberculin

1. *Tests by G. Gregory Kayne*

On the basis of tests on guinea-pigs Parish and Okell (1929) and Okell (1930) found that dilutions (1 in 500 to 1 in 4,000) of old tuberculin in saline had lost about 40 per cent. of their potency after three months' storage at 4° C., at room temperature, or at 37° C. As a working rule they consider that sterile dilutions of old tuberculin in saline may safely be used even after being kept for one month at room temperature. Douglas and Hartley (1934) detected no loss of activity when dilutions of international standard old tuberculin in 0·5 per cent. phenol saline were stored at 2° C. and at room temperature for 53 days. Deterioration was observed, however, when they were stored at 37° C. for 53 days.

The opinion is commonly expressed, nevertheless, that dilutions of old tuberculin should not be used when more than two weeks old. Mantoux tests in human subjects were therefore carried out to investigate this statement, and a test made of the stability of dilutions of international standard old tuberculin in 0·5 per cent. phenol saline kept at various temperatures.

The different dilutions were used "blindly"—that is, they were labelled with symbols at the Wellcome Laboratories and the key was supplied to me later. This procedure is necessary so as to avoid the influence of preconceived ideas in reading reactions that are not sharply outlined. Since as many as four injections were made on one arm, the order in which dilutions were injected in each patient was varied to obviate the possible influence of the texture of the skin. Readings were taken at 48 and 72 hours, and for these investigations a dilution of 1 in 10,000 was used.

The results are shown in Tables V and VI.

Table V

Three Dilutions of Old Tuberculin kept in the Ice-chest 9 Weeks, 7 Weeks, and 5 Weeks Respectively, and a Dilution Prepared the Previous Day

Readings	Results (Number of Positives) in 20 Patients			
	Fresh	5 weeks old	7 weeks old	9 weeks old
At 48 hours ...	18	18	17	17
At 72 hours (19 patients only read) ...	16	17	16	17

Allowing for some experimental error in reading, there appears to be no deterioration of the tuberculin even after nine weeks at 4° C.

Since I consider the reading at 72 hours should be the one adopted for the Mantoux test, it appears that there is no deterioration of the tuberculin kept for seven weeks at room temperature, but definite deterioration occurs if kept for this period at 37° C. After eleven weeks there is definite deterioration if the tuberculin is kept at either of these temperatures.

In conclusion, the common opinion that dilutions kept for two weeks should not be used errs very much on the side of caution. Dilutions may be employed with safety up to six weeks, at all events if kept at room temperature, and for nine weeks if kept in an ice-chest.

TABLE VI

FOUR DILUTIONS OF OLD TUBERCULIN KEPT AT ROOM TEMPERATURE (22° C.) FOR 11 WEEKS, AT 37° C. FOR 11 WEEKS, AT ROOM TEMPERATURE FOR 7 WEEKS, AND AT 37° C. FOR 7 WEEKS RESPECTIVELY

	Results (Number of Positives)			
Patients Read	At 48 Hours		Patients Read	At 72 Hours	
20	Fresh 14 (70%)	11 weeks 22° C. 10 (50%)	20	Fresh 16 (80%)	11 weeks 22° C. 9 (45%)
26	„ 18 (70%)	11 „ 37° C. 9 (35%)	26	„ 17 (65%)	11 „ 37° C. 11 (42%)
23	„ 17 (74%)	7 „ 22° C. 14 (61%)	22	„ 12 (54%)	7 „ 22° C. 12 (54%)
22	„ 16 (73%)	7 „ 37° C. 12 (54%)	21	„ 15 (71%)	7 „ 37° C. 12 (57%)

2. *Tests by A. T. Doig*

On the lines described above a test was made of the stability of 1 in 10,000 dilutions of old tuberculin kept at 4° C. for four weeks and for eleven weeks. The injections were made about the middle of the forearm (one on the right arm and two on the left), and in the same order on each patient. The skin in the elbow and wrist regions was avoided, but otherwise possible differences in the texture of the skin were disregarded.

Twenty-six patients were tested, of whom four did not react to any of the dilutions. The readings, taken at 48 hours, were :—

1 in 10,000 dilution O.T.	3 days old	21 positive (1 doubtful)
„ „ „ „	4 weeks old	22 positive
„ „ „ „	11 „	21 „

It is therefore concluded that old tuberculin, even in dilutions of 1 in 10,000, is a considerably more stable substance than is commonly believed and storage for as long as eleven weeks at 4° C. causes little appreciable loss of potency.

EXPERIMENT TO TEST THE ACCURACY OF THE MANTOUX TEST WITH OLD TUBERCULIN

By G. Gregory Kayne

When one of the dilutions investigated was 1 in 10,000 of international standard old tuberculin a 40 per cent. difference in potency between two dilutions was barely detectable, although a 60 per cent. difference had an appreciable influence on the number of positive reactions obtained (Table VII).

The differences in potency shown in the table suggest that we should examine once again the results of the Mantoux tests with P.P.D. and old tuberculin presented earlier in this paper. It will be remembered that the dilutions of the two preparations supplied from the Wellcome Laboratories were about equal in potency on intracutaneous tests in guinea-pigs ; differences in the size of the reactions were trifling, P.P.D. appearing to be the stronger only on the most sensitive animals.

TABLE VII

FOUR DILUTIONS OF OLD TUBERCULIN, 1/10,000, 1/12,500, 1/16,600, AND 1/25,000, CORRESPONDING TO 100 PER CENT., 80 PER CENT., 60 PER CENT., AND 40 PER CENT. OF A DILUTION OF 1 IN 10,000.

	Results (Number of Positives) in 24 patients			
	100%	80%	60%	40%
At 48 hours ...	16	18	17	13
At 72 „ ...	19	19	17	12

It is perhaps worthy of comment that few tuberculous guinea-pigs are sensitive to 1 in 10,000 dilutions of tuberculin, whereas many patients in sanatoria give large positive reactions to this dilution.

We are indebted to Dr. J. W. Trevan for the following statistical note :—

" The experiments on guinea-pigs recorded earlier in this paper show a distribution which would, I calculate, occur by accident about eight times in a hundred trials on groups of 46 guinea-pigs. Any difference between P.P.D. and O.T. for the guinea-pig is therefore not large enough to be established by the use of 46 guinea-pigs with the degree of probability that is usually taken as significant, but the results are suggestive.

" The experiments recorded in Table III (228 patients), whether the total or only the 1 in 10,000 dilution figures are used, give a highly significant excess of P.P.D.>O.T. over P.P.D.<O.T. It can be taken as established that P.P.D. in the doses used is more potent than O.T. This is borne out by Table I (119 patients) and Table IV.

" But it cannot be established that P.P.D. is more potent than O.T. for man when given in doses which are identical on guinea-pigs, for there are more observations on man. It must not be assumed that since the differences in man are highly significant, whereas those on the guinea-pig are not significant by the ordinary criterion, there is a real difference between the relative potencies on man and on the guinea-pig. Further multiplication of tests on the guinea-pig might quite well result in the establishment of a significant difference between the dilution doses of P.P.D. and O.T. used for that animal."

Summary and Conclusions

1. Attention is directed to purified protein derivative (P.P.D.) as the most suitable reagent for the Mantoux test. It is the active principle isolated in a pure state as a dry powder from a

synthetic medium old tuberculin. It corresponds to Seibert's SOTT (synthetic medium old tuberculin trichloracetic-acid-precipitated). It is almost invariably of constant potency on a weight basis, is very stable in the dry state, and is of a non-sensitising nature. It is therefore particularly suitable for use in large-scale surveys where uniformity in the amount of the active principle injected is essential.

2. "Dried dilutions" which are likewise of uniform potency and quite stable can also be prepared from P.P.D. As a precautionary measure the potency of these "dried dilutions" is checked from time to time against the international standard old tuberculin, the intracutaneous test in the tuberculous guinea-pig being used for the comparisons. On no occasion has any variation been observed from the calculated potency. The "dried dilutions" may be redissolved easily and quickly in a suitable borate buffer solution immediately before use.

3. A series of "dried dilutions" of P.P.D. have been compared with corresponding dilutions of international standard old tuberculin by means of the Mantoux test, the two tuberculins having been titrated previously on sensitive guinea-pigs. On intracutaneous test in a large number of guinea-pigs the preparations were almost equal in potency, only the most sensitive animals indicating that the "dried dilutions" were a trifle stronger.

4. The reactions obtained with P.P.D. were very similar in character to the response with old tuberculin, both in guinea-pigs and in human subjects.

5. Clinical comparison, both by measurement and by the relative number of positive and negative reactions obtained, indicated that the P.P.D. was slightly more potent than the old tuberculin, a fact that was only evident on the most sensitive guinea-pigs.

6. The results of the four clinical workers suggest that if the Mantoux test were to be used as a method of comparing the potency of two tuberculins it would be necessary to have observations on a large number of patients before any conclusion could be drawn. There would appear to be no advantage in using human subjects instead of guinea-pigs for the titration of old tuberculin.

7. In practice the deterioration of dilutions of old tuberculin in phenol saline is not sufficient to prevent their use for Mantoux tests if they have been kept up to six weeks at room temperature or nine weeks in the ice-chest. "Dried dilutions" of P.P.D. are much more stable, and have shown no detectable loss in potency after three years at room temperature.

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References

Aronson, J. D. (1934.) *Amer. Rev. Tuberc. Suppl.* **30.** 727.

——— and Nicholas, R. V. (1933.) *J. Immunol.* **25.** 483.

Davis, L. J., and Guzdar, J. S. (1935.) *J. Hyg.*, Camb. **35.** 300.

Douglas, S. R., and Hartley, P. (1934.) *Tubercle.* **16.** 105.

Hart, P. D'A. (1932.) Med. Res. Cncl. Spec. Rep. Ser. **164.** 47. London.

Kayne, G. G. (1936.) *Brit. J. Child. Dis.* **33.** 20.

Long, E. R. (1934.) *Amer. Rev. Tuberc. Suppl.* **30.** 757.

——— and Seibert, F. B. (1926.) *Amer. Rev. Tuberc.* **13.** 393.

Madsen, T., and Holm, J. (1935). *Quart. Bull. Hlth. Org. L.o.N.* **4.** 475.

Okell, C. C. (1930.) Med. Res. Cncl., *System of Bact.* **5.** 308. London.

——— and Parish, H. J. (1927.) *Brit. J. exp. Path.* **8.** 170.

Parish, H. J., and O'Brien, R. A. (1935.) *British Medical Journal.* **1.** 1018.

——— and Okell, C. C. (1929.) *J. Path. Bact.* **32.** 51.

Philip, R. W., McKendrick, A. G., Begbie, R. S., Kermack, W. O., and Stewart, D. (1930.) *J. Hyg., Camb.* **30.** 221.

Quigley, J. J. (1934.) *Amer. J. Hyg.* **20.** 218.

Reichel, J., and Clark, L. T. (1934.) *Amer. Rev. Tuberc. Suppl.* **30.** 721.

Seibert, F. B. (1928.) *Amer. Rev. Tuberc.* **17.** 402.

———. (1932.) *Ibid.* **25.** 724.

———. (1933.) *Trans. Nat. Tuberc. Ass.* 29th Ann. Mtg. p. 165. New York.

——— (1934.) *Amer. Rev. Tuberc.* **30.** 713.

Sarcomatous Neoplasia and the Subcutaneous Tuberculin Test

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In the *Veterinary Record*, for April 16th, 1938, there is an abstract from the case reports, small animal clinic, the University, Zürich (Amman, K. (1937.) *Schweiz. Arch. Tierhlk.* **79.** 5. 197-206). Among the cases mentioned is one referring to abdominal tumours (sarcomata) in dogs, in which it is stated that these cases gave a positive reaction to the subcutaneous tuberculin test. This was of interest to the writer since he had a similar experience in dealing with an outbreak of tuberculosis in poultry. The flock was one of 100 birds in a large house on entirely new ground, not hitherto used for poultry. The presence of tuberculosis in the flock was first diagnosed in the laboratory of the Institute and subsequently confirmed at the Ministry's laboratories at Weybridge. The case was one of unusual interest, since the flock was one of pullets, and the birds typically affected were those of six weeks to six months

of age. Also the disease ran an acute form, many birds dying in a few weeks. The outbreak was complicated by the fact that the birds were also affected with leucosis, a disease of the blood-forming organs with an increase in the number of white blood cells (especially lymphocytes) and the formation of round white, tumour masses in the splanchnic viscera. *Post-mortem* examination of eleven birds showed three to be infected with a widespread tuberculous infection with miliary foci in the intestinal wall, the liver, spleen and lungs, one also being affected with leucosis. Seven were affected with a primary leucosis, with large tumours in the liver and peritoneum, and one was an isolated case suffering from cirrhosis of the liver, dropsy, and hypertrophy of the heart.

Specimens of the tumour masses in the seven leucotic birds were removed for histological examination.

The remaining birds of the flock were tested with avian tuberculin, 0·1 c.c. being injected intradermally into the wattle. The first reading, at 24 hours, revealed 19 birds to have a large doughy swelling in the wattle.

It was suspected that the presence of leucosis, as being an increase in the white blood cell count, would materially affect any inflammatory reaction, and this was explained to the owner. At the final reading of the test, at 48 hours, three birds presented a diffuse hot swelling in the wattle and were removed as positive reactors to the tuberculin test. Nine which presented a small circumscribed cold swelling at the point of inoculation, were removed as doubtful reactors. An autopsy on three, however, revealed no tuberculous lesions. Two were leucotic, and the third had a large tumour of the kidney, which was examined histologically.

Summary.—It is stated in the case reports of the small animal clinic, the University, Zürich, that dogs suffering from abdominal sarcomata gave a positive reaction to the tuberculin test.

A flock of birds was tested intradermally with avian tuberculin for the presence of avian tuberculosis.

It sometimes happens that owing to the struggles of the bird the tuberculin is not injected intradermally into the skin of the wattle but subcutaneously, between the two layers of the skin of the wattle.

A large number of birds were found doubtful reactors. Autopsy showed these to be affected with tumours, histologically shown to be sarcomatous—typically lympho-sarcoma.

Previous *post-mortem* examinations on the same flock of birds had shown the widespread occurrence of tumours, probably infectious in nature, which histologically were found to be sarcomata.

Is there a connection between these findings and those of the University of Zürich? If so, what is the explanation?

REVIEW

[**Veterinary Pathology and Bacteriology** (Gaiger and Davies) Second Edition (1938) Davies. pp. x + 712. 198 figs. 25s. Baillière, Tindall and Cox, London.]

The second edition of Gaiger and Davies's Veterinary Pathology and Bacteriology will receive a wide welcome. Professor Gaiger's lamented death so soon after the appearance of the first edition laid a great responsibility on his co-editor. Mr. Davies has taken the revision of the text in hand very thoroughly and re-written a great deal of it.

For reasons which are given the recommendations of the Salmonella sub-committee of the Nomenclature Committee of the International Society of Microbiology have not been followed, and all the members of the coli-typhoid group are described under the generic name *Bacterium*.

This is essentially a text-book for students of veterinary science and in its composition descriptions have been simplified and condensed in order to make room for the essential matter while retaining a book of handy size.

The book contains an enormous mass of information on subjects that are not dealt with suitably in other similar publications in the English language and can fairly be claimed to have fulfilled the purposes for which it was written.

In a book covering such a wide range, odd statements are almost bound to occur that might fail to meet with approval. Thus, the reader might infer from the statement on p. 231, that the incidence of Tularaemia is limited to California. Those who work with contagious bovine pleuro-pneumonia will not agree that cultures that have been sub-cultured about a dozen times are necessarily safe.

The general arrangement of the text follows closely that of the first edition, but there are many additions necessitated by the developments in the subjects during the last half decade.

There is an excellent index running to over 30 pages.

The printing is excellent and the binding is serviceable.

ABSTRACTS

[Bovine Phthisis: Its Incidence in North-East Scotland. Griffith, A. Stanley and Smith, J. (1938.) *Lancet.* **234.** 5978. 739-742.]

The tubercle bacilli isolated from 636 cases of human pulmonary tuberculosis in the north-east of Scotland were typed. Of 342 strains received from cases occurring in eight counties and in the Orkney and Shetland Islands, 31 (9·1 per cent.) were of the typically dysgonic bovine type, and of 294 strains from cases in the city of Aberdeen 13 (4·4 per cent.) were similar. Clinical details of the 44 persons infected with bovine tubercle bacilli are given and it appears that the duration of clinical tuberculosis from the first appearance of symptoms to the date of the first sputum examination ranged from a few months up to nine or ten years.

S. J. E.

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[Alimentary Tuberculosis in Calves. Schumann and Fritzsche (1938.) *Berl. tierärztl Waschr.* 6. 77-81.]

This experiment was carried out to study the pathogenesis of tuberculosis produced in young calves by the ingestion of tuberculous milk. The animals were obtained from tuberculin negative cows, were given colostrum for the first two days after birth, and the experiment was begun on the third day.

The first calf received infected milk from the third to tenth day together with a suitable supplement of "ordinary commercial milk." During feeding, the animal continually dipped its head into the bucket and must have aspirated some of the infected milk. Respiration became laboured 14 days after the first feeding and increased up to four weeks, at which time the intradermal tuberculin test gave a positive reaction—the swelling being the size of the palm of a man's hand! The animal was slaughtered 25 days after the last dose of infected milk, being then in very poor condition. The autopsy disclosed primary tuberculosis of the tonsils and pharyngeal glands, intestines, and lungs. The liver and various lymph glands were secondarily affected. The primary lesions already showed commencing calcification.

A second calf received a single dose of two litres of the same sample of tuberculous milk by the stomach tube. The tonsils were thus excluded from contact with the milk, rumination being absent in a three-days-old calf. The animal was killed 31 days later having given a pronounced positive tuberculin test. It showed primary tuberculosis of the mesenteric glands and of a Peyer's patch in the ileum. There were no other tuberculous lesions.

A third calf received tuberculous milk for 14 days and 16 days later gave a marked positive tuberculin reaction. Slaughter two days later showed primary tuberculosis of the tonsil and pharyngeal and mesenteric glands. No lesions were found in the Peyer's patches.

A single dose of two litres of milk given to a fourth calf by stomach tube did not result in a positive tuberculin test 32 days later. No macroscopic lesions were found at autopsy although microscopically a single tuberculous focus was found, *viz.*, a lymph gland related to the ileum.

In the second calf, tuberculosis was found in the liver only by microscopical examination and guinea-pig inoculation: it is suggested that the meat inspection regulation should be altered so as to demand condemnation of liver and portal glands in cases of alimentary tuberculosis in suckling calves, even although no liver lesions are found on naked-eye inspection.

E. G. W.

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[Some Observations on the Intradermal Tuberculin Test Applied to Pigs. Hankin, T. H. (1937.) *Austral. Vet. J.* **13.** 6. Dec., 1937.]

In the meat export works at New Zealand up to 20 per cent. of pigs have been found to be affected with tuberculosis. Years ago the sterilisation of waste dairy products was advocated to control the incidence of the disease in pigs, and was most successful, and the present testing described is the result of some further efforts at controlling the disease in pigs.

A minimum amount of "Pasteur tuberculine brute," diluted one in four with sterile water, was injected intradermally in the base of an ear, and the site of injection examined by palpation 72 hours later. Pigs, as a rule, did not object to the needle prick, but in some cases it was necessary to restrain them. Reacting animals showed a very definite swelling at the site of injection, varying from the size of a hen's egg down to that of a thrush's egg, of a similar nature to that found in bovines reacting typically to the intradermal tuberculin test. In some cases there was a slight sloughing, the swelling persisted up to ten days or more, and, when slaughter was carried out within this period, the reaction could be easily detected when the pig had been scalded and scraped. On those cases where a *post-mortem* examination was made, most of the lesions appear to have been in the submaxillary glands, and of 50 cases which showed lesions that under meat inspection would be classed as

"tuberculous," only three were positive to microscopic examination, 47 being negative, whilst of 26 tested further by guinea-pig inoculation, 11 were positive (1 avian), and 15 negative. These results show that of the 50 specimens examined there were at least 15, and probably more, in which the lesions were non-tuberculous.

The author stresses the desirability of some method being arrived at whereby the nature of the numerous small lesions found by meat inspectors in submaxillary glands of pigs could be definitely determined, as they are at present all classed as "tuberculosis," but it is not suggested that the present method of condemning the heads when such glands are abnormal should be altered in routine meat inspection.

Pigs having well-developed tuberculous lesions react to the intradermal tuberculin test, but in those with early or very slight lesions the test may fail. It would appear to be quite useful in testing adult breeding stock and should detect younger pigs that are affected to a degree likely to cause spread of infection to in-contacts; it can therefore be regarded as of definite value in assisting to control tuberculosis amongst pigs, when used in conjunction with other measures.

D. J. A.

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[Much Granules. Groh (1937.) *Zlb. Bakt.* **139.** 7. 343-353.]

Much, in 1907, described three stages in the development of the tubercle bacillus—an acid-fast rod, a non-acid-fast rod, and a granular form. The last two could be stained by the prolonged use of Gram's stain (Much's method). These findings were based on a study of human and bovine tuberculous material; they have since that time been both confirmed and denied.

The author examined 206 cases of human tuberculosis, 32 bovine cases, eight cases in rabbits, and two cases in guinea-pigs. He considers Much's acid-fast rods to be dying or dead forms of the tubercle bacillus, and the granules to represent developing spores.

In areas of caseation, the tubercle bacilli are no longer acid fast and cannot be stained; the granules within them or lying free can be demonstrated by prolonged staining methods.

The tubercle bacillus is considered to exist only as acid-fast bacilli or as spores; the latter ripen and become acid-fast bacilli. Cultural examination and animal inoculation confirmed the view that most of the non-acid-fast rods are dead bacilli.

E. G. W.

[Intravenous Use of Sodium Iodide in Actinomycosis. Farquharson, J. (1937.) *J. Amer. Vet. Med. Ass.* **91.** 5. 551-554.]

In this paper the author records the success which he has obtained with the intravenous injection of sodium iodide in the treatment of actinomycosis, this term being used in its broadest clinical sense to include actinobacillosis.

Preparations of iodine have long been used in the treatment of this condition, but the author points out that potassium salts are too toxic for intravenous use. Sodium iodide, on the other hand, is very safe, its cost is negligible and it does not give rise to iodism. In the author's hands it has given a higher percentage of recoveries and more certain results than any other form of treatment. Its one disadvantage is that it causes abortion in pregnant animals.

The dose of sodium iodide is one ounce in a pint of sterile distilled water for an animal weighing 1,000 pounds. For animals of 1,500 pounds, one-and-a-half ounces may be given and for those of approximately 500 pounds from four to six drachms. Only one treatment is necessary. The injections should be made slowly and, if towards the end of the injection a systemic reaction should occur the injection should be stopped. These reactions occur in less than 5 per cent. of cases but the results are not unfavourable and no deaths have resulted from its use.

G. D.

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[Investigations into the Biological Diagnosis of Pregnancy. Sartoris, P. (1937.) *Nuovo Ercolani.* **42.** 1. 1-20.]

This article discusses the value of biological tests for pregnancy in domestic animals, and records experimental work to determine the value of such tests in the case of cattle. After obtaining negative results from the injection of urine, prepared in accordance with the technique of Brouha and Simonnet, into male mice, an attempt was made to concentrate the hormone by the method of Zondek. Even with doses believed to represent the amount of hormone contained in 120 c.c. of urine of cows known to have been pregnant for two or three months, no reaction could be provoked in mice.

It is pointed out that this genital reaction in immature male mice is said to be reliable in the case of pregnant women, using either blood serum or urine, but in domestic animals, except for the horse, no sexual hormone can be demonstrated. It is suggested that this cannot be ascribed to anatomical differences in the placenta, and that further work on the sexual endocrines of animals should be undertaken.

U. F. R.

In Parliament

The following are among the questions and answers recently recorded in the House of Commons:—

Milk (Bacteriological Standards)

Mr. Liddall asked the Minister of Health whether he is aware of the dissatisfaction felt by public health medical officers at the inadequate bacteriological standards for graded milks, and of their anxiety over the absence of any compulsory bacteriological standard for ungraded milk which is consumed by the vast majority of inhabitants of this country; and what steps, if any, he is taking to remedy this state of affairs?

Mr. Elliot: I am advised that the bacteriological tests prescribed for graded milks are adequate as a standard of cleanliness, but that a similar standard for all other milk is not practicable at the present time. I would, however, refer my hon. Friend to the Government's proposals for promoting the cleanliness and purity of the milk supply as set out in the White Paper on Milk Policy.

. . . . .

Pasteurized Milk

Mr. Macquisten asked the Minister of Health whether his attention has been drawn to advertisements by the British Medical Association extolling the merits of pasteurized or half-boiled milk, and urging that all milk be compulsorily pasteurized or half-boiled; and whether he can assure the House that his Department will not give effect to such views?

Mr. Elliot: I am aware of announcements by the British Medical Association with regard to the merits of pasteurization. The proposals of the Government with regard to pasteurization are set out in the White Paper on Milk Policy.

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Beef

Mr. W. Roberts asked the Minister of Agriculture whether it is proposed to issue regulations governing the grant of bonus in the case of attested herds engaged in the breeding of store cattle or in the production of beef; and, if so, when?

Mr. Morrison: Yes, Sir. A scheme under Section 20 of the Agriculture Act, 1937, is in an advanced stage of preparation, and I hope that it will be possible to introduce it at an early date.

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Food

Mr. Morgan asked the Minister of Health whether he proposes to take any action to remind local authorities of the need for giving effect to the public health provisions with regard to the examination of all food offered or distributed in connection with Christmas draws, goose-club distributions, and similar seasonal movements?

Mr. Elliot: I hope to deal with this matter in a circular to local authorities on the Food and Drugs Bill if it becomes law.

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Diseased Poultry (Marketing)

Mr. Johnston asked the Secretary of State for Scotland the health administrative area in Scotland where, during the year 1937, certain farmers were in the habit of sending their diseased fowls to the market irrespective of condition or probable use; and whether, when these fowls were discovered and seized under Section 43 of the Public Health (Scotland) Act, 1897, the vendors were prosecuted, and with what results?

Lieut.-Colonel Colville: In order to control the condition of fowls offered for sale in Ayr, the town council have standing arrangements for the inspection of fowls at the Ayr cattle market. Under these arrangements, fowls offered for sale for human consumption may be traced, and, if found to be diseased, are seized and destroyed, and when the evidence is sufficient the owners are prosecuted. It is understood that there were no prosecutions in 1937.

Mr. Johnston: Are we to understand, from that reply, that Ayrshire is the only health administrative area in Scotland where these precautions are taken; and why is it specially indicated in the annual report of the Department of Health for Scotland that these fowls were sent into the market in a diseased condition?

Lieut.-Colonel Colville: I should require notice of that question.

IMPORTATION OF CATTLE FROM EIRE

The Cattle (Import Regulation) Order, 1933, which prohibited the importation from Eire of any beef or veal or, except under licence, of cattle other than dairy cattle was revoked by an Order made by the Board of Trade which came into force on May 19th, 1938. As from that date the importation of cattle from Eire will be governed by the Cattle (Import from Eire) Order, 1938, made under the provisions of Section 3 (3) of the Eire (Confirmation of Agreements) Act, 1938, by the Minister of Agriculture and Fisheries, the Secretary of State for Scotland and the Secretary of State for the Home Department, which was issued on May 17th. General powers are taken in the Order prescribing the times and places at which cattle may be imported from Eire into the United Kingdom and making provision as to the routes to be followed by cattle so imported and as to their detention for inspection. The routes to be followed and the places and times at which animals are to be inspected are set out in detail in the First Schedule to the Order and Article 1 prohibits importation except at one of the ports or by one of the land routes mentioned. Provision is made in this Article for any exceptional importations that the appropriate Minister may authorise by licence.

Article 2 of the Order provides that an animal shall not be moved from a landing place in Great Britain or from a port or point of entry into Northern Ireland until it has been examined.

Arrangements have been made with the Government of Eire for determining the numbers of fat cattle, store cattle, and other descriptions of bovine animals that are imported into the United Kingdom. Accordingly bovine animals shipped from a port in Eire to a port in Great Britain will be accompanied by a certificate filled in by a veterinary officer at the port of embarkation from Eire and the Master of the vessel carrying the animals is required by Article 3 of the Order to deliver this certificate to the officer of the Ministry of Agriculture and Fisheries at the port of landing.

Penalties are provided for contravention of the Order, and Article 4 provides for the seizure and sale of animals thus imported or brought into the United Kingdom.

In general the methods of entry and the authorised ports and routes are the same as those already in use for the trade in cattle between Eire and the United Kingdom but additional responsibilities will devolve under the Order upon the authorised veterinary officers of the Ministry of Agriculture and Fisheries as regards import into Great Britain, and of the Ministry of Agriculture of Northern Ireland as regards that country.

The Veterinary Record

May 28th, 1938.

The Veterinary Officer and Meat Inspection in England

THE veterinary profession for many years has been anxious that the important position of the veterinary surgeon in the duties associated with the inspection of meat should be officially recognised by statute. Representations by the Royal College of Veterinary Surgeons and by the National Veterinary Medical Association have repeatedly been made to the Ministry of Health and other appropriate bodies in an endeavour to secure this desirable change, but all efforts have hitherto been fruitless.

In England and Wales the veterinary officer of a local authority has not by virtue of his appointment been an authorised officer for the purpose of these duties. Before he could undertake fully the duties of meat inspection his local authority has been compelled to appoint him a sanitary inspector. This practice has continued in spite of progressive changes in the law in nearly every other country. Of the four divisions of the British Isles it is only in England and Wales that the veterinary officer is not specifically given his proper status by statute as the officer best qualified to act as inspector of foods of animal origin. In Scotland, by Section 43 of the Public Health (Scotland) Act, the veterinary surgeon is specifically named, and it is specially provided that in the case of any proceedings under the Section with regard to a living animal, the medical officer or the sanitary inspector, unless he is himself a qualified veterinary surgeon, shall be accompanied by a veterinary surgeon. In Northern Ireland, by the Agricultural Produce (Meat Regulation) Act, 1930, Section 5, all meat for exportation must have been inspected by a veterinary inspector of the Ministry of Agriculture and found by him to comply with the prescribed requirements. By Section 9, any carcases or portions of carcases or offals, certified by a veterinary inspector of the Ministry of Agriculture to be unfit for human consumption must be rendered incapable of being used for the food of man. In Eire, the inspection of meat is governed by the Public Health (Veterinary Inspection) Order, 1929, and it is provided under the Local Government Act of 1925 that one of the sanitary officers of any local authority shall be a qualified veterinary surgeon. Sanitary authorities are, moreover, empowered to take steps to appoint such number of veterinary inspectors as are necessary for the supervision of the meat supply. In most continental countries, the United States of America, Canada, and nearly all other progressive countries, the veterinary officer is similarly given his rightful place in this important work.

In spite of this widespread official recognition and of the recommendation of the Departmental Committee on Meat Inspection, 1921, to the effect that provision should be made for the inspection of meat to be carried out by duly qualified veterinary surgeons, the representatives of the Ministry of Health charged with the drafting of the Food and Drugs Bill were unable to agree to the request of the deputation from the National Veterinary Medical Association, that the veterinary surgeon should be specifically mentioned for the purposes of meat inspection. The Parliamentary Committee of the Association therefore decided to press the matter on the committee stage of the Bill, and, as was reported in our last issue, a representative of the Association attended the necessary meetings of the Joint Select Committee of both Houses of Parliament and put forward an amendment to the clause defining an authorised officer. The matter was debated, decision postponed, and later an amendment to the effect that veterinary officers of local authorities charged with duties of food inspection shall automatically be authorised officers for the purposes of the inspection of meat was agreed.

The Bill is not yet the law of the land, but should it pass Parliament unchanged it is clear that one of the constant irrifations to the veterinary profession in England will have been removed, a development due in large measure to the persistence of the "National," to the restriction of its suggestions to amendments that were eminently reasonable, and to its insistence upon its desire to work amicably with all other officers engaged in public health duties.

Although we agree with the view expressed editorially by *The Lancet* on May 1st, 1937, namely, "In the inspection of meat for human

food the man who must by virtue of his training know most about the abattoir is the veterinary surgeon. He is the one best qualified to detect disease in the food animal before slaughter and to guarantee the soundness of the flesh when dressed for human consumption," we are equally cognisant of the desirability, in the interests of the public, for effective co-operation with the medical and sanitary officers, and it is our earnest desire that such co-operation shall be truly and generously given.

MILK AND PASTEURIZATION

Addressing a sessional meeting of the Royal Sanitary Institute at Yeovil on the above subject, Sir William Savage, Medical Officer of Health for Somerset, said "We shall never get the milk supply of this country on a satisfactory basis or obtain that increased consumption of milk which we all desire until the medical and veterinary professions and the public are satisfied as to the quality of the supply. We all desire a cheap, clean, safe milk, and a milk drunk more abundantly by the people.

"I have no bias in favour of pasteurization if I can get safe milk in any other way, but I find no alternative. I firmly believe that it is in the interests of all connected with milk to unite in a policy of a safe milk supply, and if we can get it safe we ought to be able materially to reduce costs and get it cheaper."

Sir William declared that the opposition of milk producers to pasteurization was directly against their own interests. There was now a large body of practical experience in the United States and elsewhere which showed that there was a singular absence of any detrimental effect on milk which had been pasteurized.

If a butcher sold meat from a tuberculous cow he was fined, but if the animal contaminated the milk supply with virulent tubercle bacilli before slaughter, and the fact was discovered, the owner was compensated on slaughter. This was an anomalous position which could not be justified if at the same time the owner resisted other measures, such as pasteurization, to nullify the danger.

In reference to producer-retailers, Sir William said: "They deal only with about 17 per cent. of the milk sold for liquid consumption. They are now in a specially favoured position, which I consider they do not merit. The costs of producing milk of good quality are considerable and, although the retail price of liquid milk is high, I consider that the producer earns all he receives of this price. The retail price is, in general, well over double what the producer receives, and obviously there must be satisfactory service to warrant these large distribution charges.

"The larger companies, with their pasteurization plants, bottling equipment and the like, can produce a safe milk, but the producer-retailer, who merely vends the milk as he produces it, is not entitled to this marked difference, and should only get it if he takes the trouble to provide and use equipment to ensure delivery of a clean, safe milk, and that means pasteurization and delivery in bottles or properly sealed containers."

REPORT

Northern Rhodesia

REPORT OF THE VETERINARY DEPARTMENT, 1936

From this report we gather that the Veterinary Department of Northern Rhodesia, which moved its headquarters from Livingstone to Mazabuka in 1932, now consists of eight veterinary surgeons with a corresponding clerical and lay staff.

Dr. P. L. le Roux, whose helminthological work is well known, and who during the year was awarded the Doctorate of Science of the University of Edinburgh for a thesis on helminths parasitising animals in Southern Africa, is the veterinary research officer at the central research station at Mazabuka.

Here the ordinary routine laboratory work of diagnosis, smear examination, chemical tests, milk analyses, etc., has been carried out and at the same time Dr. le Roux has made some valuable observations on the supplementary feeding of pedigree stock, the preparation of such feeds, the actual time of cutting and stages of development of permanent incisors of heifers, cattle dipping and trypanosomiasis. The Director must have regretted, owing to shortness of staff, having to send Dr. le Roux from the research station to the Tanganyika border where rinderpest was threatening. The move was necessary but we feel that the veterinary staff of a territory such as Northern Rhodesia should be adequate to deal with such threatened invasions of animal disease without interfering with the continuity of research work.

Mr. J. P. A. Morris is the Director of Veterinary Services and his report, which is of a comprehensive nature, covers the whole field of animal disease at present and previously found in Northern Rhodesia, together with sound advice on the native cattle industry, its development and future possibilities, local cattle markets, the dairy industry, and the general veterinary work of the territory.

There are four appendices to the Director's Report, namely:—

(1) The new cattle levy ordinance and regulations.
(2) An extract from a report on contagious bovine pleuropneumonia experimentation by H. S. Purchase, B.Sc., F.R.C.V.S.
(3) Dr. P. L. le Roux's annual report.
(4) An account of heartwater by Captain F. E. Jones, M.R.C.V.S.

From the Director's Report we find that the flagrant faults of native animal husbandry are just as apparent here as in other parts of the

subcontinent, and are stated by Mr. Morris to be:—

(*a*) Neglect of castration
(*b*) Unhygienic kraals and calf houses
(*c*) Injudicious grazing
(*d*) Neglect of disease
(*e*) Failure to cull

and it is pointed out that there is little hope of improvement except by Government effort and expenditure. The lines on which such improvement can be accomplished are indicated as being an incorporation of animal husbandry in native schools curricula, increase of district stock inspectors, re-institution of dipping in native reserves, castration of surplus bulls, funds for the purchase and issue of improved bulls to native herds, improved water supplies, the establishment of a Government stock farm, and the starting of a selected herd of indigenous cattle at the central research station.

It is observed that, though goats thrive in the territory, the sheep industry shows little progress, the limiting factors being stated as unsuitable grazing, heavy internal and external parasitism, and losses from carnivora.

Horse sickness has caused equines to be little used up to now, but this may soon be changed as the neurotropic vaccine produced at Onderstepoort is reported as proving a complete success.

One of the most satisfactory statements in the report is that relating to foot-and-mouth disease. The last focus of foot-and-mouth infection was eradicated in the Monze district in January, 1936, where 67,000 cattle were subjected to intramucosal tongue inoculation, since when the territory has been free from the disease, and we know the successful efforts of the Department in this connection would be fully appreciated by the residents of the territory.

Captain F. E. Jones, in his appendix on heartwater, differentiates between the acute and subacute forms, and stresses the importance of the examination of intima smears for diagnosis, and for this Leishman staining is recommended. He considers the value of drug treatment as questionable and recommends five-day-interval dipping from October to March.

We are doubtful if this will be effective in eradicating the Bont tick, the heartwater carrier, unless dipping is continued, say, at weekly intervals, for the rest of the year. On S.A. ranches south of the Zambesi, regular weekly dipping has given excellent results after it has been in vogue for a year, and a 30 to 40 per cent. loss of the calf crop due to heartwater, redwater and gallsickness has been entirely eliminated.

Finally, Captain Jones states what has been suspected for some time, namely that 90 per cent. of alleged cases of veld poisoning in Northern Rhodesia are actually heartwater.

The history of bovine pleuropneumonia in Northern Rhodesia, as narrated in this report, is a series of unfortunate occurrences. The Director records that this disease was brought into the Barotse province from Angola in 1915, when neither the department nor the police were at full strength, and that the casual and lay staff employed were undisciplined and incompetent. We are told that aseptic precautions were unthought of, and the after-care of inoculated animals was neglected, with the result that the protective inoculation performed by officials of the Administration resulted in an enormous mortality. The report states that the confidence of the natives was completely lost, and that to this day they view any veterinary measures with the deepest suspicion.

Apparently the Administration was compelled to stop any combative measures and a police cordon was drawn around the Barotse valley to prevent cattle exit and this has been maintained ever since. No reasons are given as to why such a destructive disease has been allowed to spread at will through the Barotse valley for a period of over 20 years, for we are told that it has "materially retarded the prosperity of the native community and the few European trading interests, but also constitutes an ever present menace to the remainder of the territory," and, we imagine, is a constant anxiety to adjoining territories. The cost of maintaining the police cordon might, it appears to us, have been better spent on a well-conducted campaign of eradication.

During the year under review, the Paramount Chief has given certain promises of assistance to the Department and Mr. H. S. Purchase has experimented with vaccine obtained from the Kabete laboratory and conducted other research work prior to the start of a campaign of eradication. We note that Mr. Purchase's experimentation is being confined to laboratory vaccine, which is most useful and, in fact, invaluable when outbreaks are becoming few and, as sometimes happens, the fluid obtained from the pleural cavity of an affected animal is unsuitable for inoculation. Thoracic fluid, in the reviewer's experience, gives a stronger and more lasting immunity than cultures, and in a country like Northern Rhodesia has the advantage of being readily and easily obtainable on the spot immediately an outbreak occurs. Thoracic fluid was responsible for the eradication of bovine pleuropneumonia in the Cape Colony, Natal, and the Orange Free State, and was mainly responsible for its eradication in the Transvaal and Bechuanaland Protectorate, although good use was

(*Concluded at foot of col.* 1, *page* 652.)

VICTORIA VETERINARY BENEVOLENT FUND

MEETING OF COUNCIL

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at No. 10, Red Lion Square, London, W.C.1, on Thursday, April 7th, 1938.

Lieut.-Colonel J. W. Brittlebank (President) occupied the chair, and the following members were present: Messrs. H. W. Dawes, P. F. Dolan, G. H. Livesey, G. H. Locke, J. W. McIntosh, A. MacKenzie, G. P. Male, W. Nairn, Mrs. M. Nickinson, Lieut.-Colonel P. J. Simpson, Mr. Arnold Spicer, Professor G. H. Wooldridge, Mr. Wm. Woods and Lieut.-Colonel T. Dunlop Young.

The minutes of the previous meeting held on January 12th, 1938, having been published, were taken as read and signed as correct.

Letters of apology for absence were received from Major F. L. Gooch, Mr. J. Ewing Johnston, Major C. W. Townsend, and Mr. W. Jackson Young.

Correspondence.—A letter was received from the Professional Classes Aid Council inviting the appointment of a representative of the Veterinary Profession on the Council, and Mr. Arnold Spicer was nominated to serve.

Secretary's Report

The following report of the Secretary was read and approved, and the Secretary was instructed to express the thanks of the Council to the respective donors.

	Collecting Boxes			*Donations*		
Central Veterinary Society	2	0	10			
Derbyshire Veterinary Association	1	5	0			
N. Ireland Veterinary Medical Association	2	7	6			
N. Wales Division V.M.A. ...		12	6	6	5	4
Cairn Terrier Association (per Mr. Cornish-Bowden)				1	1	0
Heythrop Pony Club (per Capt. Hewer)					10	6
R. Hudson				5	0	0
Lancashire Veterinary Association ...				2	2	0
Ladies V.V.B. Fund Guild (proceeds of dance)				46	10	0
Lincolnshire and District V.M.A. ...				2	12	0
Mrs. M. McCarville (per Miss M. Stewart)					10	0
G. McKee					10	0
C. S. Randle (Life Member)				10	10	0
Roberts, C.				4	8	6
S. Sharp					10	0
Scottish Soc. of Veterinary Inspectors				3	12	0
Society of Veterinary Officers ...				29	10	5
H. Stainton (Crufts Dog Show) ...				10	0	0
Veterinary College of Ireland (proceeds of dance)				8	1	0
Yorkshire Veterinary Medical Asscn.				3	3	0
				£134	16	3

Life Membership.—Mr. C. S. Randle was elected a Life Member of the Fund.

Annual Report.—A draft of the Annual Report was submitted and approved for issue to the members before the Annual General Meeting.

Cases

117. Widow, aged 49. Three daughters aged 21, 16 and 15; eldest training as a nurse earning £30 a year, the others just leaving school. It was resolved "That in the present state of the Fund no grant can be made in this case."

127. Four sisters, aged 60, 63, 74 and 76. Receiving a grant of 30s. a week. Eldest died on February 21st and the Executive Committee made a grant of £5 towards funeral expenses. It was decided to continue the grant for the present at the same rate.

175. Widow, aged 57. No income, living with brother. The grant in this case was discontinued.

179. Aged 59. Husband, aged 83 in Workhouse Infirmary. The grant of 10s. per week was continued.

185. Aged 64, daughter of member. Has had to give up boarding house and is living in flat, rent 15s. per week. Is receiving a temporary grant of 7s. 6d. per week from the Professional Classes Aid Council. The grant of £1 per week was continued.

190. Aged 47. Wife of member. One child, aged 13. The Executive Committee made an emergency grant of £2 in January. The action of the Executive Committee was approved and a grant of 10s. a week was made for the present quarter.

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made of laboratory vaccine towards the end of the campaigns in both the latter territories. For this reason, it would seem desirable not to rely entirely on laboratory vaccine.

Mr. Purchase records that he is endeavouring to obtain virus (if any) from a "lunger," and we anticipate he will have difficulty in doing so. The "lunger" does not retain infection as often as is commonly supposed, but that he occasionally does so is beyond doubt and this has been proved times out of number in the field.

The practical bearing is that the *sine quâ non* of any eradication scheme must be the immediate destruction of all animals that become clinically affected.

Bovine pleuropneumonia is now, and has for many years been, the major problem confronting Northern Rhodesia, and we hope the measures now begun will be attended with similar success to that obtained in the other South African States.

208. Aged 30. Son of deceased member. Unemployed. One son, aged 4. Wife ill. A special grant of £1 had been made by the Executive Committee. The action of the Executive Committee was approved but it was decided that no further grant be made.

209. Widow, aged 55. Two daughters, aged 18 and 13; still at school. Temporary income 25s. per week. No grant was made in this case.

211. Widow, aged 60. One son, aged 28, in the Royal Air Force. No grant was made in this case.

212. Widow, aged 69. One son, aged 30, married with two children. Applicant suffers from rheumatism. A grant of £1 per month was made in this case.

213. Aged 43. Daughter of deceased member. Unemployed through ill-health. The Secretary having reported that he had made an emergency grant of £1 10s., his action was approved but it was resolved that no further grant be made.

214. Widow, aged 56. Four daughters and two sons, all but one at work. No grant was made.

Accounts

The Secretary reported that he had been authorised by the Ladies' Guild to credit their contribution, if necessary, to the current relief account. It was resolved "That the sum of £200 (two hundred pounds) be transferred from the Donations Account to the Current Account."

Subscriptions

The Secretary reported that the amount received in subscriptions in 1937 was only £46 less than in the previous year, but was instructed to issue a circular to the profession with a view to increasing the subscription list, and to call the attention of the various Divisions of the National Veterinary Medical Association to the needs of the Fund.

Investments.—The Treasurer was authorised to invest the amount in the Donations Account in a suitable investment.

DISEASES OF FUR ANIMALS

The United States Department of Agriculture, Washington, D.C., in Farmers' Bulletin No. 1777, gives an account of the diseases attacking fur-animals on the farm, together with methods of control. Descriptions are given of distemper, paratyphoid infection and encephalitis of foxes, of hookworm, tapeworm and fluke affections, and of external parasites such as fleas, lice and sarcoptic mange, as well as of nutritional disturbances. Useful information is also given on farm sites and structure, their sanitation and disinfection. The Bulletin should be of value to those engaged in the fur industry in Great Britain.—*Nature.*

N.V.M.A. DIVISIONAL REPORTS

Central Veterinary Society

A most informative paper on a subject now recognised to be of paramount importance to the stock-owning community, and consequently to the veterinarian, in this country, "The Control of Contagious Abortion," and a masterly reply to the discussion upon it by the author, Dr. A. D. McEwen, Head of the Veterinary Department of the South-Eastern Agricultural College, Wye, Kent, rendered the meeting of the Central Veterinary Society held at the Conway Hall, Red Lion Square, W.C.1, on April 7th, 1938, a memorable occasion.

The President (Professor J. McCunn) occupied the Chair, and there were also present: Messrs. L. S. Balls, W. F. Barton, W. P. Blount, W. Brown, H. E. Bywater, Captain J. C. Coleman, Mr. J. J. Davies, Miss C. M. Ford, Messrs. N. S. King, A. B. MacIntyre, J. W. McIntosh, H. G. McShane, G. P. Male, Captain G. Dunlop Martin, Dr. R. F. Montgomerie, Miss K. Morant, Mr. B. S. Mulvey, Lieut.-Colonel W. S. Mulvey, Messrs. C. W. Ottaway, G. H. K. Peace, W. Perryman, Veterinary Lieut.-Colonel G. Rees-Mogg, Mr. N. J. Scorgie, Dr. A. W. Stableforth, Messrs. J. S. Steward, C. N. Thompson, J. F. D. Tutt, Miss O. Uvarov, Miss R. R. Wallis, Messrs. W. J. B. Watson, R. A. Willett, Professor G. H. Wooldridge and Dr. W. R. Wooldridge.

The following were present as visitors: Messrs. J. W. Beaumont, T. J. Bosworth, Miss W. M. Branckner, Messrs. R. D. Callaghan, W. H. Dennett, Dr. A. D. McEwen, Messrs. A. Neve, F. W. Priestley, K. C. Sellers, A. Smiles, J. W. Whittick and E. Wilkinson.

The minutes of the February meeting having been published in *The Veterinary Record*, were taken as read and signed as correct. Approval of those of the March meeting was deferred pending their publication.

Correspondence.—(1) From the following Fellows, apologising for their inability to attend the meeting: Messrs. Downing, Griffiths, Hodgman, Kirk, Pryer, Scott Dunn, F. W. Willett and Sir John Moore.

(2) Two communications from the Chairman and Secretary of the British National Committee of the Thirteenth International Veterinary Congress, indicating the advantages and inviting membership of the Congress; also appealing for a donation towards a fund to defray the expenses of delegates.

(3) From the General Secretary of the N.V.M.A. with regard to the Society's representation on the Council of the Association.

In this connection the Secretary informed the meeting that that Division of the "National" was entitled to seven representatives. It was resolved that this matter be referred to the Council of the Society and that their recommendations thereupon be placed before the next meeting.

Nomination.—Brigadier C. A. Murray, Director-General, R.A.V.C., was nominated as a Fellow of the Society by Sir Frederick Hobday, the President seconding

Morbid Specimens and Subjects of Professional Interest

Mr. L. S. Balls exhibited a half of a sorbo ball which had been swallowed by a bull terrier and which took five weeks to pass through the bowel.

Mr. Perryman drew the attention of the meeting to an item appearing in the quarterly news sheet of the National Horse Association, to which he was a representative from the Society, in reference to alleged outbreaks of sleeping sickness in horses in the United States and Canada. It was stated that the National Horse Association appreciated that this disease had not appeared to any great extent in this country, but that that Association had communicated with the Ministry of Agriculture urging that everything in their power should be done to prevent the introduction of this disease into the country and that in particular horses imported from abroad should be most carefully watched. The Association reported with gratification that the Minister had informed them that he proposed to amend the Importation of Horses, Asses and Mules to Great Britain Order of 1921 so as to require every horse, ass or mule brought into Great Britain from abroad to be accompanied by an official veterinary certificate of freedom from this as well as other infectious equine disease. [A note on this matter appeared in the issue of *The Veterinary Record* of February 5th, 1938.—*Editor.*]

Personally, continued Mr. Perryman, he was not aware that we had any sleeping sickness in horses in this country: whether it was an old-fashioned disease under a new name, he did not know, but he thought the Society should be made aware of the matter, and if there was any information that could be given to the meeting, he should be very glad.

Discussion on the foregoing having been invited by the President, Dr. Stableforth said that with regard to Mr. Perryman's observations concerning sleeping sickness in equines, he thought that the condition referred to was encephalomyelitis. The action reported by Mr. Perryman had been taken as the result of the fear that the disease might be brought into this country, and *The Veterinary Record* had asked for an annotation on the subject.

Professor Wooldridge commented, in regard to the specimen exhibited by Mr. Balls, that it was of rather unusual interest in that the history of the case might help one in making subsequent decisions when similar cases presented themselves.

Mr. Balls brought that dog to him for a second opinion, and on palpating the abdomen one could feel a foreign body in the intestine. The question arose as to whether enterotomy should be carried out straight away or not. Beyond the fact that there was an occasional twinge of discomfort, the animal appeared normal, and they decided to leave matters as they were to see if the foreign body would be passed. They put the dog on frequent doses of liquid paraffin daily and gave repeated hot enemata each day.

The animal went on brightly, the speaker seeing it for several days, after which Mr. Balls kept it under observation. That evening, Mr. Balls informed him that five weeks after the dog was first seen it spontaneously passed that piece of rubber. The interesting point was the decision one had to take in regard to the immediate performance of a laparo-enterotomy or the awaiting of events. In this case, the choice of the latter course proved to be fully justified. Apparently the piece of rubber was fixed edgeways across the intestine and allowed ingesta to pass.

Paper.—The President now called upon Dr. McEwen to present his paper, which was heard with very great interest and which promoted a well-sustained discussion, admirably opened by Dr. A. W. Stableforth.

[This paper and a report of the discussion, together with that of the essayist's reply thereto, will be published in an early issue of the *Record.—Editor.*]

Votes of Thanks.—The President, moving the vote of thanks to Dr. McEwen, said that he had been a member of that Society for a long time and he did not know that he had ever listened to such a capable reply. From the chair, therefore, he desired to move a very hearty vote of thanks to Dr. McEwen, both for his paper and for his reply.

The vote of thanks was carried with acclamation, and, there being no other business, the meeting concluded with a tribute to the President for his conduct of the proceedings.

H. E. Bywater, *Hon. Secretary.*

Changes in the Cabinet include the appointment of Mr. Walter Elliot as Minister of Health. Mr. Elliot, it will be remembered, was the Minister of Agriculture when the policy was adopted that came to fruition as the Livestock Industry Act.

Lincolnshire and District V.M.A.

ANNUAL MEETING AT GRANTHAM

The annual general meeting of the above Society was held at Grantham on February 10th, 1938.

The President, Major C. W. Townsend, occupied the Chair, and the following were present: Messrs. F. W. Gooch and W. W. Lang (Honorary Members); Major A. N. Foster, Messrs. G. Eaton, R. Swaby, F. W. L. Gooch, J. H. Poles, C. Weighton, A. J. James, A. L. Auchterlonie, M. R. MacFarlane, A. J. Hines, G. Lockwood, W. A. Dickinson, T. J. Keall, Major T. Hicks, and Mr. W. Gibson (Members); Miss V. Tillemont-Thomason and Messrs. W. F. Kochan and D. P. MacAllister (Visitors).

The minutes of the last meeting, having been published in *The Veterinary Record*, were taken as read and signed by the President.

Correspondence.—Apologies for absence were received from Dr. G. B. Brook, Messrs. T. Bindloss, W. K. Townson and G. Gibson.

Letters were read from the Victoria Veterinary Benevolent Fund and from the Royal Sanitary Institute. On the proposition of Major A. N. Foster, seconded by Major T. Hicks, Mr. F. W. Gooch was again appointed the Society's delegate to their Congress at Portsmouth.

Resignations.—Letters of resignation were received from Mr. J. Porter-Smith and Mr. H. P. Standley. These resignations were accepted with regret, and on the proposition of Major T. Hicks, seconded by Mr. W. W. Lang, Mr. Porter-Smith was elected an Honorary Member of the Society, in appreciation of his long and valuable service to the Association.

Finance.—The Hon. Treasurer, in presenting his report, said that there was a balance in the bank of £21 15s., and a further amount of arrears in subscriptions of £8 owing. The present Membership of the Society is 39, with seven Associate Members. A balance sheet was passed round for inspection.

On the proposition of Mr. F. W. Gooch, seconded by Mr. G. Eaton, it was decided to send donations of two-and-a-half guineas to the Victoria Veterinary Benevolent Fund and to the National Veterinary Benevolent and Mutual Defence Society, also on the proposition of Mr. Lockwood, seconded by Major Hicks, a similar amount to the Adrian Jones Statue Appeal Fund.

Report of the Delegate to the Royal Sanitary Congress, 1937.—This report, having been held over from the last meeting, was read by Mr. Gooch. A vote of thanks was passed to Mr. Gooch for attending the Congress and for his interesting report in which he emphasised the benefit it was to the profession if veterinary surgeons attended the Sanitary Congress. Major Foster, in adding to these remarks, said that sanitary inspectors obtained and held many positions that veterinary surgeons should hold, and he thought it would help in this respect if more members attended the Sanitary Congress.

*Received for publication April 20th, 1938.

Election of Officers

President.—Mr. Hudson was elected, on the proposition of Mr. Gooch, seconded by Mr. Swaby.

President-Elect.—On the proposition of the Secretary, it was decided to elect annually a President-Elect, and on the motion of Mr. Lang, and seconded by Mr. Dickinson, Major Foster was elected to this office.

[Mr. Hudson has since written saying he is unable to accept the office of President this year.]

Vice-Presidents.—The following Vice-Presidents were elected: Messrs. C. W. Townsend, R. Swaby, and W. W. Lang.

Hon. Secretary and Treasurer.—In proposing the re-election of Mr. W. Gibson, the President stated that the thanks of the Society were due to him for the continued success of the Division which was now in a sound financial position with an increased attendance at the meetings during the last year. This was seconded by Mr. Gooch.

Representative to the Council of the National Veterinary Medical Association.—Mr. W. W. Lang.

Motion by Major Foster

Speaking to a motion, standing in his name in the agenda, "To discuss the standardisation of fees in this district," Major Foster said: "As you are well aware, there is great divergence in the fees charged by different practitioners for exactly similar veterinary services, and this divergence occurs when the status of the owners in the various cases is to all intents and purposes identical. In view of the fact that the N.V.M.A. has ruled that the minimum salary for junior official veterinary appointments is to be £450 per annum on a rising scale, that after a certain period of probation the appointment is regarded as permanent, and after a certain length of service, retirement on pension takes place, and that during service there are always chances of promotion to a higher scale, I think it is high time that collective effort should be made to improve the financial reward of general practitioners and to safeguard their interests. The services rendered by the general practitioner are really as efficient, important and onerous as those rendered by the official.

"It is not my intention to suggest in detail a scale of fees for general veterinary services, but I will mention a few where great anomalies obtain." [Major Foster proceeded to illustrate his point by instancing the varying fees charged by practitioners for castration, the examination of herds for the production of accredited milk, and for conferring active and/or passive immunity against swine erysipelas.

Proceeding, Major Foster observed: "Local authorities and some public institutions through their veterinary staffs (which consist of officers salaried at the rates laid down by N.V.M.A.) have performed veterinary services at fees which are far too low to meet the costs which have to be met by self-supporting general practitioners. I mention in this connection tuberculin-testing, examinations for the protection of accredited milk, examination of herds of cattle and blood testing for the eradication of contagious abortion. This is most unfair, and the N.V.M.A. and R.C.V.S. should never have allowed such a procedure.

"The issue of biological products, vaccines and sera for animal use, should be effectively controlled and should be restricted to members of the veterinary profession.

"Many Associations in other districts have drawn up a scale of fees for the majority of veterinary services, which I understand the practitioners in the areas have loyally adhered to with much benefit to themselves, their clients and their patients.

"I propose that a Committee of five be appointed to consider the standardisation of fees in this district and to draw up a minimum scale to be approved by all members of this Association."

Major Foster's motion was discussed at some length by members present and a Committee of five, namely, Messrs. Foster, Lang, Lockwood, MacFarlane and Weighton, was appointed to go into the matter thoroughly and also the the question of the sale of biological products to laymen and to report at the next meeting.

Meat Inspection

It was unanimously agreed that the following resolution be sent to the Council of the National Veterinary Medical Association:—

> "That as the Agriculture Act does not include 'Meat Inspection,' the situation is viewed with alarm by this Association. In the interest of public health, it should be officially recognised that the veterinary surgeon is the most competent person to inspect meat. In some centres, veterinary surgeons have been doing this work, and their positions need safeguarding under the new conditions.
>
> "The Association also wishes to bring to the notice of the Council the increasing use of biological preparations by laymen in this district."

Interesting Cases and Specimens

A Papillomatous Growth (Probably Actinomycotic)

Major A. M. Foster gave details of the above growth, exhibited by him, as follows: weight, 9½ ounces; measurements: length, 4½ inches; width, 2½ inches; circumference, short axis, 8½ inches by long axis, 11½—stating that, as seen, this was a kidney-like body with a very small attachment area.

Major Foster proceeded: "My attention was called to a cow showing signs of dyspnoea and roaring badly, she was in calf and in good condition. The cow was on her feet and the head was held by the owner only.

"I inserted the mouth gag and on exploring the pharynx felt this freely moveable body—which I was able to grasp with my hand and to tear away from its attachment to the roof of the pharynx by pushing, pulling and twisting actions. The removal of the growth afforded the cow immediate relief and she has made an uninterrupted recovery.

"The history of the case is that up to six months ago the cow appeared to be normal; thereafter her breathing became noisy and gradually worse, until she became a chronic snorer. Other than the noisy breathing, the cow appeared to be healthy and her functions normal. Suddenly on the day the owner sent for me, the cow showed signs of grave respiratory distress and suffocation seemed imminent."

Valvular Disease in the Horse

Mr. L. Auchterlonie exhibited the heart of an eight-year-old shire mare, giving the following particulars of the case.

"Seven days prior to my visit this mare, which was in fat condition, had fallen down in the shafts and my advice was sought in respect of lameness in the near hind leg which it was presumed had been injured. I found the mare to be off food with a temperature of 103.5° and a full, soft pulse of 60.

"As she had been running out until the day of my visit, I attributed her illness to a chill aggravated by exposure. Two days later, it was noted that the effects of a good rug and a box had created an improvement. The temperature was down to 102° but although the pulse rate had risen to 70 the mare was eating and comfortable. No particular reason offered itself for very special auscultation though I did not understand why the pulse was faster. The mare dropped dead the next morning.

"*Post-mortem* examination revealed the following:—

"*Mitral valves*—great thickening of the cusps which were quite smooth (old lesion). *Aortic valves*, soft vegetations of considerable size similar to the lesions in swine erysipelas. The wall of the left ventricle showed a large recent infarct. *Kidneys*—multiple haemorrhages all over cortex. *Liver*—isolated infarcts of some size.

"Considerable interest attaches to this case, which occurred about six months ago, in view of Messrs. Paterson and Wheatley's case recorded in the *Journal* of January, 1938, in which *E. rhusiopathiae* was identified as the causal organism.

"Whilst showing the specimen to a heart specialist it transpired that in the human subject an improved metabolism in malignant endocarditis occurs as it did in the case of the mare."

Perforans Tendon with an Embedded Thorn

Mr. W. Gibson exhibited the navicular bone and flexor tendons of the near fore of an aged hunter gelding, showing a thorn about 1 inch long embedded deeply amongst the fibres of the Perforans tendon.

Mr. Gibson's account of this case was as follows:—

"The horse returned from hunting sound: the next morning he was lame, the lameness increasing during the day, and the next day when I was called in the horse would not put his foot to the ground and showed typical symptoms of a septic foot. The shoe was removed and a thorough search of the foot was made without my finding anything. The foot was poulticed and thoroughly searched again two days later without result. Poulticing was continued and the foot searched at intervals for about ten days. During this time there was no heat or swelling in the region of the pastern or cannon bones and the horse still refused to take any weight on the limb. An X-ray examination was made which revealed nothing abnormal. The horse made gradual improvement and was turned out to grass in about two months, still quite lame. He remained lame all the summer, but began to improve in September when he was put into slow work and, gradually becoming sound, he was hunted until Christmas, when he appeared to be lame on a splint. This was treated with a mild vesicant and the horse became sound again, resuming hunting with occasional slight lameness which quickly responded when treatment was given to the splint.

"At the end of the season it was decided to needle fire the splint and the horse was turned out to grass and remained sound during the whole summer. As the owner was not able to hunt, the horse was left at grass during the winter and about Christmas it died from a twisted bowel.

"I made a *post-mortem* examination on the fore legs and feet and on cutting through the Perforans tendon in the region of the fetlock joint (preparatory to removing the navicular bone) found the thorn deeply embedded in the middle of that tendon. There was no thickening, inflammation, or any sign of any inflammatory process in the tendon or its surrounding tissues; in fact, the thorn was only found by the lucky chance of cutting through the tendon at that particular spot.

"The question is, how did the thorn get there? I presume that the presence of the thorn was the cause of the original and the recurring lameness and that it entered the tendon through the frog, gradually working its way up between the fibres of the tendon until reaching its ultimate position just behind the Sesamoid bones, taking about two years to do so."

Veterinary Films.—Films demonstrating the treatment of fractures in the dog and cat were kindly shown and explained by a representative of Messrs. Smith and Nephew, Ltd., of Hull.

The President thanked Messrs. Smith and Nephew for their kindness in arranging for the films to be shown at the meeting. He also thanked those members who had brought *post-mortem* specimens; these being of more than ordinary interest to him.

Vote of Thanks to the President.—Mr. Hicks, proposing the vote of thanks to the President, said that the large attendance at the meetings throughout the year proved without doubt the popularity of the President, and that by his conduct of the office he had once again shown as he did for many years, when he was Secretary of this Association, that everything he undertook he carried through in a thorough way.

Mr. Poles, seconding, said that he felt that the Society owed the President a debt of gratitude for arranging the meeting at the Remount Depot and getting his brother there to give the surgical demonstrations.

The President thanked the proposer and seconder and said that he was very gratified by the good attendance at the meetings. It had been a great pleasure to him to hold the office of President and he would always do anything he could to help the Society. He hoped the members would give the same support to the new President.

W. Gibson, *Hon. Secretary.*

When a load of trussed hay on a motor lorry brought down electric cables at Cavendish, Suffolk, Richard Wells, a smallholder, and a horse, of which he was in charge, were both electrocuted. The cables fell on the edge of a pond, where the horse, harnessed to a tumbril, was being watered.

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, 1938

LIST OF SUCCESSFUL CANDIDATES

ANIMAL MANAGEMENT

London

Bagenal, B.	McCullagh, A. F.
Barwick, Miss E. M.	MacGregor, D. E.
Blaikley, George (C)	Mares, R. G.
Blair-Fish, P. R.	Markham, A. E. G.
Butcher, Brian	Morrison, A. M. (C)
Buxton, Anthony	Newhook, J. C. (C)
Byles, Miss M. D. (C)	O'Connor, T. M.
Chandra, Brij	O'Reilly, L. B.
Chaudhari, C. P.	Osborn, Miss Joyce
Clarke, E. V.	Rand, Maurice
Davies, A. M.	Rawlinson, W. E.
Davies, W. G.	Reynolds, Miss P. M.
Dixie, E. A. W. B. (C)	Rickard, S. C.
Dobinson, Joseph (C)	Roberts, E. J.
Dyke, John	Scott, D. J. P.
Evans, E. T. R.	Smith, H. W. (C)
Fitzherbert, D. H. (C)	Taylor, W. M.
Foster, A. V. B. (C)	Threlkeld, Thomas
Hall-Patch, P. K. J.	Townson, R. S.
Hartley, J. C.	Turner, R. J.
Hesketh, W. C.	Vale, R. H.
Kirkwood, A. K.	Weatherhead, G. C.
Lake, D. P.	Wickens, J. T.
Lewis, E. F.	Williamson, G. T.
Luke, W. S.	

(C) means Credit.

(To be Continued)

SOIL EROSION IN U.S.A.

The Washington Correspondent of *The Times*, in a communication published in that journal on May 21st, states that President Roosevelt, in a special message the previous day, recommended the creation of a Joint Committee of the Senate and the House of Representatives for the study of the phosphate resources of the nation in order that a policy covering both production and conservation might be adopted.

Recent estimates (he declared) indicate that the removal of the phosphorous soils of the United States by harvested crops, grazing, erosion, and leaching greatly exceeds the addition of phosphorus to the soil through the means of fertilisers, animal manures and bedding, rainfall, irrigation and seeds.

The total known world supply of phosphate rock is estimated at 17,200,000,000 tons, of which 7,200,000,000 tons is in the United States. It appears that domestic production is overwhelmingly from Florida and Tennessee, where the deposits are in growing danger of depletion. In 1936 of the total American annual production of 3,351,857 tons, exports amounted to 1,208,951 tons.

"As Mr. Roosevelt pointed out, the question of phosphate deposits is intimately related to that of the rehabilitation of soil, the erosion of which is proceeding at an alarming rate."

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

June 2nd.—Meeting of the Central Veterinary Society, at Conway Hall, Red Lion Square, W.C.1, 6.30 p.m.

June 2nd.—R.C.V.S. Annual General Meeting. Election of Council.

June 2nd.—R.C.V.S. Annual Luncheon.

June 8th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

June 9th & 10th.—D.V.S.M. written examination.

June 13th.—D.V.S.M. oral examinations begin.

June 22nd & 23rd.—R.C.V.S. Committee Meetings.

June 24th.—R.C.V.S. Committee and Council Meetings.

June 30th & July 1st.—R.C.V.S. written examinations.

Aug. 21st-25th.—Thirteenth International Veterinary Congress, Zürich.

Aug. 26th-27th.—Thirteenth International Veterinary Congress, Interlaken.

Sept. 5th-9th.—Annual Congress, N.V.M.A., at Glasgow.

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R.C.V.S. ANNUAL LUNCHEON

Readers are reminded of the annual luncheon to be held at the Connaught Rooms, London, W.C.2, on Thursday next at 1.30 p.m., immediately following the Annual General Meeting. It is hoped that many members will make a point of attending this function. A number of distinguished guests have been invited and the President is looking forward to a representative gathering. The price of the ticket is 6s. and application should be made immediately to the Secretary, 10, Red Lion Square, W.C.1, accompanied by the necessary remittance.

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MAURICE C. HALL

An Appreciation

May I record here a few words of affectionate appreciation of my friend Maurice C. Hall, who died rather suddenly at the beginning of this month. I do not wish to write of his scientific achievements and of his important work in the development of parasitology in the United States, but of the man himself. Although there is a great deal to be said about his work and about the greatness of the loss to an important group of parasitologists of their leader and adviser, this is a calculable loss; the loss of this most lovable man to his friends and to those who were closely associated with him, however, is much greater and can never be replaced.

During part of 1926 and 1927 it was my great privilege to work in his private laboratory, when,

in the first few days, I was greatly impressed by the ease of his administration, which appeared to allow him to give unlimited time and attention to any and every person who might be in need of his advice. I soon found, however, that, in spite of this apparent leisure, a large amount of work was done, and well done, and I realised that good fortune had placed me with a man who was driving forwards with a steadfast purpose to accomplishment in his work.

As the days went by, I learned of the amazing amount of information which he had acquired, for apart from a very wide knowledge of his own particular branch of biology there was a tremendous store of scientific and historical information of a more general kind, together with a sound understanding and a wide appreciation of good literature and of human character.

An inexhaustible energy sprang from this limitless interest in men and things, and his originality of approach to every subject enabled him to make the best use of his knowledge as also to stimulate and enliven whatever company he might happen to be in.

His writings are generally recognised to be of a high literary standard, to listen to his speaking in public was a great pleasure, he built up a great research department, founded the modern method of anthelmintic investigation, discovered the most widely used anthelmintic and added much to the knowledge of animal parasites, yet, with all this, he remained the most truly humble, tolerant and approachable of men, who appeared to attach small importance to his work and to consider the development of friendship as one of life's most absorbing pursuits.

I remember a senior man on his staff, who, both in point of age and in service was actually senior to Hall himself, once holding forth to me on the undesirable character of the scramble for scientific credit which was seen by him to be almost universal among the laboratory workers of whom he had knowledge. After mentioning many of the great ones, my colleague said: "But Hall, he's different; he's a white man; he'd give every man his due, and I'd go to hell for him!"

A man who during his life can acquire so much mental grist, attain so much in his work, give encouragement and stimulate interest wherever he goes, be a leader and yet remain tolerant and humble, make friends everywhere, and keep them, has succeeded. I am proud indeed to have been numbered among his friends.

E. L. Taylor.

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"A GREAT MAN WORTHILY HONOURED"

The whole veterinary profession, we are sure, will derive legitimate pleasure and gratification from the generous comments that have been published by exalted bodies outside its own ranks upon the manner in which its members recently took occasion to do honour to its leading figure. The following is a notice which has appeared in the last (May) issue of the *Journal of Pathology and Bacteriology* (the official journal of the Pathological Society of Great Britain and Ireland):—

"**A Festschrift to Sir John M'Fadyean,** being the jubilee number (vol. 50, part 4) of the *Journal of Comparative Pathology and Therapeutics,* December, 1937.

"Croydon: H. R. Grubb, Ltd. Pp. vi and 230; with numerous portraits. 7s. 6d.

"'When a man has . . . rendered what . . . is clearly perceived to be a signal service through his own efforts and initiative, to the lasting good of his fellow men, it would seem that nothing should deter giving expression on fit and proper occasion within his lifetime to the natural, human response of gratitude. Such occasion, it was felt, had arisen at the conclusion of the fiftieth volume of the *Journal of Comparative Pathology and Therapeutics,* which had been founded in 1888 as a private enterprise by Sir John M'Fadyean, and has since been edited by him almost entirely single-handed.' On this occasion, the editor consented to the request of his colleagues that they be given a free hand in the production of the final number of the fiftieth volume and the result is the very remarkable tribute to a great pioneer which is now before us. There are appreciations of the man and his work from a large group of friends and admirers, including Sir Robert Muir, Sir John Ledingham, Professor Share Jones and Professor Wooldridge in this country, and Professors von Ostertag, Schmaltz, and Leclainche and Dr. John R. Mohler abroad. A series of special articles deals with (1) the journal, (2) the man, (3) his disciples and (4) Sir John as a speaker in council and debate. Mr. R. E. Glover, of the National Institute for Medical Research, contributes a survey of Sir John M'Fadyean's contributions to the study of tuberculosis, Mr. W. A. Pool a note on his work on 'Louping-ill,' and Mr. D. S. Rabagliati an account of 'Present-day administration of the milk and dairies legislation as influenced by the work and teachings of Sir John M'Fadyean.' There are numerous original contributions on veterinary medicine and pathology, many of them from distant parts of the Empire. Selected passages from the writings of the master are interspersed and finally there is a full bibliography of Sir John's contributions to his own journal, and a list of his chief contributions to the *Journal of the Royal Agricultural Society of England.* A very attractive feature is the excellent series of portraits, including four of Sir John himself at various ages, and others of the contributors of the principal 'appreciations.'"

"A great man worthily honoured."

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PERSONAL

Mr. John Barr, M.R.C.V.S., of Penrith, who is in a Carlisle nursing home suffering from anthrax, is now reported to be out of danger and to be progressing satisfactorily.

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Birth.—At Fairmount, 27, Roseangle, Dundee, on May 20th, 1938, to Mr. and Mrs. Andrew Spreull, junior, a daughter.

Erratum.—We regret that, through being misinformed, we stated in our last issue (p. 626) that the marriage ceremony of Mr. C. V. Watkins was performed by Canon M. A. Green. This should have read "Canon Peter Green, M.A."

. . . . .

John Jeyes Memorial Scholarship.—The Governors of the Royal Veterinary College and Hospital, London, announce that this scholarship for the year 1938 has been awarded to Mr. S. L. Hignett, B.Sc., M.R.C.V.S.

. . . . .

Will.—Mr. Ernest Peacey, M.R.C.V.S., of Cleeve Cottage, Croydon Road, Beddington, a retired veterinary official of the Ministry of Agriculture, who died on January 6th, aged 64 years, left estate of the gross value of £4,105 13s. 7d., with net personalty £2,702 12s. 3d.

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R.S.P.C.A. ANNUAL MEETING

It was reported to the annual meeting of the R.S.P.C.A., recently held at Wigmore Hall, that there was an increase of over 50,000 in the number of sick and injured animals (288,519) dealt with in the Society's clinics or under the free veterinary treatment scheme; painless destruction accounted for 161,666 animals—an increase of 11,000 on the number in 1936. Last year members of the public reported 36,627 cases of cruelty—3,857 more than in 1936. There was a slight increase in the number of cases of serious cruelty to dogs; nine persons were disqualified for life from keeping a dog, and 82 other offenders were disqualified for various periods; 74 persons—50 more than in 1936—were convicted of cruelty to cats; and other figures showed an increase in serious cases of cruelty to cattle, sheep, pigs and poultry.

To help the Metropolitan Police to identify the breeds of lost or stolen dogs, the Society and the National Canine Defence League have together presented to every police station in the Metropolitan district a copy of a book containing photographs of all the principal breeds.

The problem of protecting animals in air raids was referred to by Sir Robert Gower, M.P., in his presidential address. A special committee, he said, had been appointed to deal with the matter, and at the Society's request the Home Office had included advice in its A.R.P. booklet to house holders. The suggestion was not that dogs and cats should wear gas masks; but where it is impossible to send pets to country areas, householders were being advised to take them into the household gas-proof room. Steps were being taken for reserves of ammunition for humane killers to be put in depôts in different parts of the country. Cats presented a particularly difficult problem, and a special humane cat-catcher was being devised.

Mr. G. S. Browne, late Chief Commission for the Northern Provinces of Nigeria, was presented with the Society's silver medal "in recognition of his services to the animal welfare cause in Nigeria."

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Exhibition of Photographs Illustrating Cases

The essential nature of the work accomplished by the R.S.P.C.A. is forcefully, if painfully, exemplified by the exhibition now being held at the Society's headquarters of photographs of some of the cases of cruelty to animals with which the Society has dealt. A visit to 105, Jermyn Street, S.W.1., before June 1st (when the exhibition closes) will prove a salutary experience for anyone who is under the mistaken impression that instances of revolting cruelty must be "records of the past" in the history of the Society.

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INTERNATIONAL HORSE SHOW

A record number of entries has been received for the International Horse Show, which opens at Olympia on June 16th. The Queen will be present on June 21st, when the chief event will be a jumping competition for the King George V Gold Challenge Cup, in which officers of all nationalities will compete. Two days later, when the Duchess of Kent will visit the Show, teams of three officers will compete in the jumping competition for the Edward, Prince of Wales Challenge Cup.

A feature of great interest will be what is known as the international "Dressage" competition. It was originally intended that this most intricate and interesting development of horsemanship should be held at Prague this year, but evidently as the result of the unsettled European conditions it was decided to transfer the venue to the Olympia Show. "Dressage" is recognised as horsecraft at its highest, and "ace" horsemen from all over the world are expected to compete. It involves complete animal mastery and marvellous memorisation, as each competitor has to memorise anything up to 50 different positions and feats of horsemanship, and perform them at various specified points. According to the Secretary of the International Horse Show, it will mean that competitions between the most highly-trained horses and some of the most distinguished horsemen in the world will be seen by the British public for the first time. It may be explained that these international "Dressage" competitions take place in a different country each year, and once it is held there must not be another in any country for a year. This is the first time the international "Dressage" competition will have been seen in this country.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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"MISS ALEEN CUST" MEMORIAL FUND

To the Editor of the Veterinary Record

Sir,—Subscribers to the above fund will be pleased to hear that the Library Committee of the Royal College of Veterinary Surgeons has accepted the suggestion that the money collected for this fund should be spent in purchasing furniture for the Library, in order to augment that which is already there.

Alterations which have been carried out at Red Lion Square have made it possible to rearrange the library and it is to be equipped with furniture provided by the money from the above fund, as the memorial to the pioneer woman member of the profession.

A much needed magazine and periodical paper rack and a dozen chairs have been purchased and the remaining sum is to be spent on reading tables or any other necessary articles that are approved by the committee.

We hope that subscribers to the fund will take

the opportunity to visit the library at Red Lion Square and to see the new furniture as soon as it is completed and when they have an opportunity to do so.

We are,
Yours faithfully,
O. B. Woodward,
Petronel L. Williams,
Joint Hon. Secretaries.

Walpole House,
Burton-on-Trent.
May 19th, 1938.

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ACAPRIN: PREMUNITION AND STERILISATION

To the Editor of the Veterinary Record

Sir,—In a letter published in the *Veterinary Record* of December 4th, 1937, Mr. F. T. Harvey refers to the observation of Legg[1] who records that splenectomised calves, experimentally infected with *Babesia bigeminum*, were apparently sterilised by treatment with acaprin, no premunition resulting from this treatment. In discussing these findings Mr. Harvey asks why splenectomy should increase the sterilising power of acaprin, and as explanation suggests that the spleen may shelter a sufficient number of piroplasms from the action of the drug to establish premunition.

It is noteworthy, in this connection, that a similar opinion was expressed by De Kock,[2] who is probably the leading authority on splenectomy of animals, when discussing the rôle of the spleen in immunity to protozoal diseases, and more especially to piroplasmosis and anaplasmosis. He reviews the literature on the subject, and the observations of workers on splenectomy in human and veterinary medicine concerning the part played by the spleen in the formation of antibodies, stating "It would appear that these antibodies are continually liberated in the spleen by virtue of a labile or latent infection which is maintained by the spleen probably on account of its involved system of blood sinuses." While Barcroft's reservoir function of the spleen is not mentioned in this paper, the conception of an enclosed infection, absent after splenectomy, is common to both this paper and Mr. Harvey's letter. The opinion expressed in De Kock's paper supports the tentative answer to his own question which Mr. Harvey puts forward in his letter.

With reference to the sterilising power of acaprin, my experience of the treatment of *B. bigeminum* infection with the drug is limited to seven cases of typical acute red-water fever in high-grade cattle. All these animals recovered rapidly, but one hesitates to draw conclusions concerning the efficacy and safety of the drug from so small a number of cases. It is not possible, in the conditions obtaining in this province, to judge whether cattle treated for babesiasis are premunised or sterilised by treatment. The economic value of most cattle is as a whole low, with the result that relapses, particularly if they be mild in character, must often pass unobserved. Moreover, compulsory seven-day dipping is in force throughout the province, and cases or outbreaks of clinical babesiasis are almost invariably associated with some interruption of correct tick-control measures. The appearance of disease being followed by strict attention to such measures, the affected herds are as a rule no longer exposed to the infection which would reveal whether or not treated animals are premune.

The treatment of canine babesiasis with acaprin does furnish evidence of the efficiency of the drug to which Mr. Harvey refers. I have records of the treatment, with a single subcutaneous injection, of a clinically representative series of 23 consecutive cases. All have recovered rapidly and none have relapsed after treatment. Carmichael[3] has reported the successful results of treatment of 24 cases, none of which relapsed. This absence of relapses, in contradistinction to treatment with trypanblue, suggests that sterilisation may be effected by acaprin. It is a generally accepted fact that in protozoal diseases clinical relapses after treatment, which does not sterilise but enables the patient's defence forces to establish premunition, are usually a manifestation of the action of some factor such as exposure, over-exertion, shock, under-nourishment, intercurrent disease, etc., which factor has upset the balance between the host and the parasite in the favour of the latter. The freedom from relapses in dogs treated with acaprin suggests that they have been sterilised rather than premunised.

Yours faithfully,
H. R. Binns.

Veterinary Department,
Blantyre,
Nyasaland.
April 27th, 1938.

[1]Legg, J. The treatment of piroplasmosis (*P. bigeminum*) with Akiron. *Austral. Vet. Jour.* Vol. 12. (1936.) pp. 227-230.

[2]De Kock, G. The relation of the spleen to immunity in bovine piroplasmosis. 15th Rep. D.V.S., South Africa. (1929.) Vol 1. pp. 9-14.

[3]Carmichael, J. A note on the treatment of canine babesiasis. *Vet. Jour.* Vol. 91. (1935.) 10.

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METHODS OF TUBERCULIN TESTING

To the Editor of the Veterinary Record

Sir,—Most of the queries which appear in your correspondence columns go unanswered, but I trust that the same fate will not meet my first enquiry.

Why, sir, is it that the double intradermal tuberculin test is used in this country in preference to the single injection caudal fold test?

In Canada, in the year ending March 31st, 1936, 498,520 tests were made by the caudal fold method, and it has proved satisfactory for many years.

I suggest that it has the following advantages over the double intradermal test:—

(1) There is less manipulation and chance of tissue damage.

(2) It saves cost as only two visits are needed.

(3) It saves time because the reaction lesion is not calibrated.

(4) It makes for smoothness of execution in that testing can be organised so that injections are made on Thursdays, Fridays and Saturdays, and readings are made on Mondays, Tuesdays and Wednesdays. This cannot be said for the double test.

Quoting from "Bovine Tuberculosis," 1937, published by the Canadian Department of Agriculture, it is seen that the following results

have been obtained in counties chosen at random:—

	Year	Cattle Tested	Per cent. reactors
County of Shefford	1928	40,433	18·5
	1929	36,480	0·7
	1932	45,037	1·4
County of Huntingdon	1924	22,900	10·1
	1926	22,790	0·7
	1929	27,298	0·54
	1932	26,114	1·4
	1936	24,652	0·26

Reference to the booklet will show that these results are typical of restricted areas in Canada.

In view of the foregoing facts, I think you will agree that a reply from an expert who advocates the use of the double intradermal test in this country is not an unreasonable request.

Finally, may I ask where is any real statistical evidence showing that the double intradermal test with all its disadvantages is more accurate than the single test which is so simple?

I trust, sir, that you will use your influence, if necessary, to enable me to have a reply to a question which, while of academic interest to me now, is of some importance to the country, which pays for tuberculin testing.

I am, Sir,
Yours faithfully,
EDWARD F. PECK.

Old Croft,
Buntingford, Herts.

May 18th, 1938.

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DOCKING THE HORSE'S TAIL

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—I have followed with considerable interest the correspondence in your columns on this subject. I was extremely interested to read the replies to Mr. Campbell's very practical remarks.

I am of the opinion that the arguments for docking heavy draught horses are logically and rationally unanswerable. In this connection it must be observed that there is little or no comparison between heavy draught horses which often work in shafts and are driven by all classes of drivers, and carriage or coach horses which are not confined to shafts and whose drivers are usually masters of their art.

The operation performed with a local anaesthetic is quite painless and the healing process thereafter must occasion comparatively little pain.

The alternatives to docking are: (*a*) To leave the tail in its natural condition. This is both unhygienic and impracticable. In this condition the tail must be a constant source of irritation to both horse and driver. Further, while the horse is in the shafts the tail becomes soiled and in any case it cannot be wielded to keep flies at bay. (*b*) To remove the excess hair by pulling. This operation is more painful, both in performance and after effects, than docking and it must be repeated frequently. (*c*) To remove the excess hair by clipping. To be effective this must be done frequently and well. I cannot imagine either of these conditions being fulfilled under modern agricultural labour conditions. With neglect this method of treatment leads to a heavy, bushy tail which becomes foul. This tail, too, is the most dangerous because the reins can so easily become entangled with it. Finally, such a tail is valueless for repelling flies.

With reference to the replies to Mr. Campbell's letter, I feel that it is fairly obvious that a horse which has no huge mass of hair on his tail will in fact be cooler at work, will sweat less and consequently will be less liable to chills and other ills caused by heavy sweating. Another writer suggests that as no one has written in support of Mr. Campbell this silence indicates that everyone agrees with the opposite view. This surely is an extraordinary assumption: consider what would happen if we all wrote letters in support of, or dissenting from, every opinion we saw expressed? The entire *Veterinary Record* in its present form would not hold one-half of the weekly correspondence. The truth is that most of us have little time and even less inclination to write.

In conclusion, I may say that I for one feel that the N.V.M.A. has acted very unwisely in supporting the Docking and Nicking (Prohibition) Bill.

Yours faithfully,
J. P. PICKERING.

Long Close,
Hexham,
Northumberland.

May 18th, 1938.

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SALT STARVATION IN CAMELS

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—In your issue of April 2nd, 1938, you published a note on salt starvation in camels.* The analysis of the salt used has now been received and will be of interest to some of your readers.

Potassium (K) 0·29
Sodium (Na) 36·59
Magnesium (Mg) 0·36
Calcium (Ca) 0·53
Chlorine (Cl) 57·23
Sulphate radical SO_4 1·99
Carbonate radical CO_3 not detected
Phosphate radical PO_4 not detected
Iodine (I) less than 0·0002
Moisture and combined water 3·06
Matter insoluble in water 0·38
Total 100·43

I am, Sir,
Yours faithfully,
EDWARD F. PECK.

Old Croft,
Buntingford, Herts.

May 18th, 1938.

*V.R. 50. 14. 409.

That the three M.P.s for Bucks had been written to and asked to support an amendment to the Bill prohibiting the docking of horses, the amendment being to exempt animals of three months old or under, was reported to the Executive Committee of the Buckinghamshire Branch of the Farmers' Union. One member replied in favour of the Farmers' Union point of view, one member was absent abroad, and the other answered against the Farmers' Union resolution.